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PORTABLE LIGHTERS

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Fig. 1.

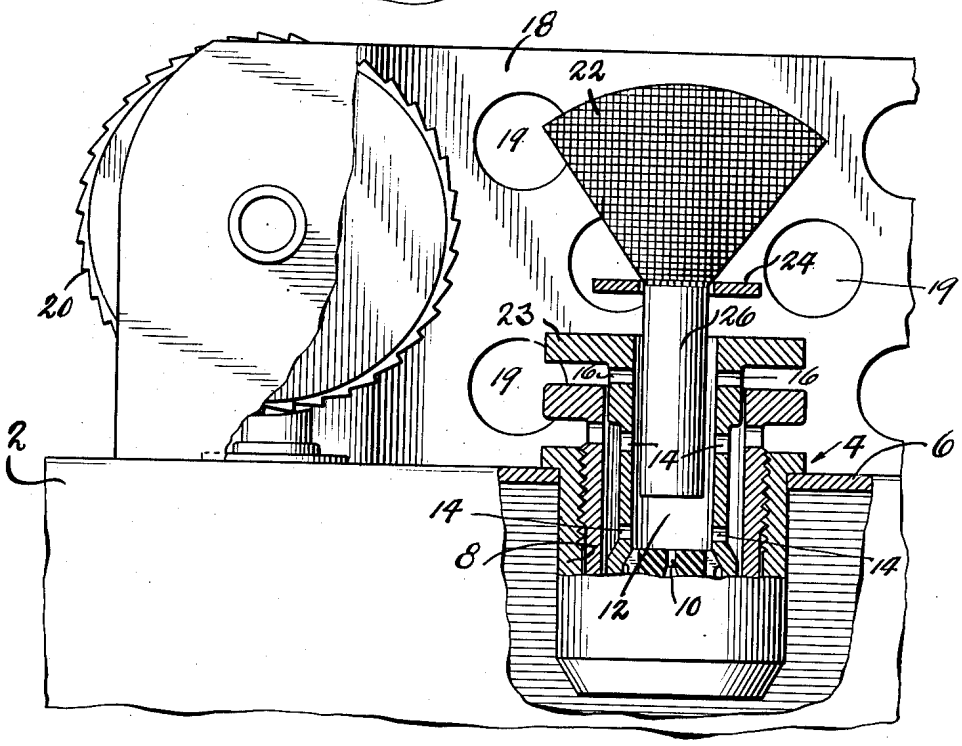
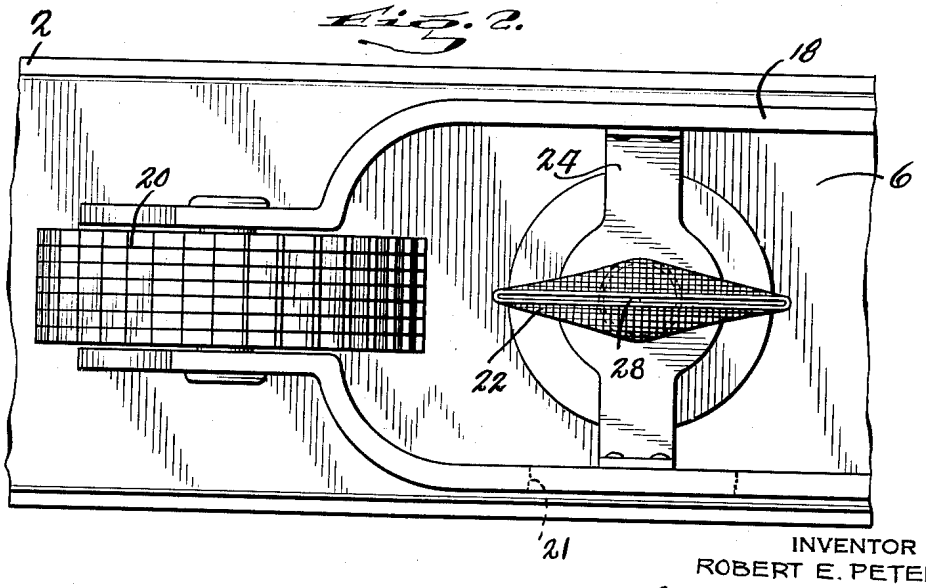


Fig. 2.



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PORTABLE LIGHTERS

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5 Claims. (Cl. 67—7.1)

My invention is directed to an improvement in portable lighters of the type employing a low-boiling-point liquified fuel which is maintained in its liquid form by reason of its own vapor pressure, as distinguished from lighters of the wick type employing a liquid as a fuel.

One object of my invention is to provide a construction in portable lighters of the type above referred to whereby flame propagation and flame retention are promoted.

In lighters of the type to which my invention relates, the fuel is stored in the lighter casing and released when the lighter is operated, ignition mechanism being provided for igniting the fuel at the lighter fuel outlet. After ignition is initiated, the lighter should continue to operate so long as the valve controlling the discharge of the fuel remains open.

While portable lighters of the gaseous fuel type are in commercial use, up to now difficulty has been experienced in obtaining uniform, consistent, and satisfactory operation. Many times difficulty is experienced in obtaining ignition on the first operation; in other words, when the lighter cover is opened, at which time the valve controlling the discharge of the fuel is opened and the igniter mechanism is caused to function, very often there is ignition failure, requiring that the lighter cover be closed and again opened. Several theories have been advanced as to the cause of this faulty operation. One theory is that, because gas varies in volume with temperature changes, the gas pressure within the lighter varies, and on a cool day the gas pressure may have dropped sufficiently so that, on the first attempt at operation of the lighter, there is insufficient gas at the lighter outlet for ignition purposes. On the other hand, on a warm day the gas pressure may be so high that, when an attempt is made to operate the lighter, the fuel is moving at such a high velocity that it is difficult to ignite it by conventional ignition.

Regardless of what the correct theory may be with respect to improper operation, my invention provides a construction wherein the difficulties above referred to are overcome.

In the construction constituting the subject matter of this invention I provide a gas-permeable member in the path of the gas and air mixture as it emerges from the outlet of the burner of the lighter. This gas-permeable member is positioned in the burner outlet so that, as the gas and air mixture flows from the outlet of the burner, it must pass into this member and out through the walls thereof.

The gas-permeable member I employ is preferably a very fine mesh metal screen, so that the fuel—gas and air mixture—passing therethrough is further mixed and broken up into a myriad of very tiny streams. It will be appreciated that under such conditions a highly combustible mixture is obtained, so that ignition is easily and certainly effected. As a matter of fact, ignition takes place readily where my improved construction is employed even when the igniter mechanism has become

so worn that in conventional construction it would have to be replaced.

I have found also from hundreds and probably thousands of tests that my construction provides a flame which is retained under the most trying draft conditions. I am uncertain as to the theory involved, but I believe that this flame retention is due to the fact that the gas and air are very thoroughly and uniformly mixed because of their passage through the mesh screen, and the flame is probably made up of many tiny flame jets, which are difficult to extinguish by a draft of air.

I find also with my improved construction that complete combustion of the fuel is obtained, and a blue, carbon-free flame is produced.

Another characteristic which I have found inherent in my improved lighter is that the base of the flame of the lighter is immediately at the base of the mesh screen, that is, immediately at the burner outlet, whereas in conventional gaseous fuel lighters the base of the flame is spaced a perceptible distance from the burner outlet. I believe that this characteristic may be related in some fashion to the certain ignition and excellent combustion I obtain and possibly may have some bearing on the superior flame-retaining characteristics of my lighter.

In the accompanying drawings, wherein I have illustrated an embodiment of my invention,

Fig. 1 is a fragmentary side elevational view, partly in section, of the top of a portable lighter embodying my improved construction; and

Fig. 2 is a plan view of Fig. 1.

Referring to the drawings in detail, **2** designates the casing of a portable lighter, the casing functioning in this instance as the container for the lighter fuel, which, as above mentioned, is a low-boiling-point liquified fuel maintained in its liquid form by reason of its own vapor pressure, such as propane or butane.

4 designates a valve-and-burner-unit assembly, which is adapted to be inserted through the casing top **6** into the casing interior. This assembly may be of the type described in my co-pending application Serial No. 295,154, filed June 24, 1952, and comprises a plug or fixture **8** containing a gas valve, which, when open, permits fuel from the lighter casing to flow through the valve stem bore **10** to the air-aspirating and mixing chamber **12**.

14 and **16** designate a plurality of air-intake ports, whereby, as the gaseous fuel flows toward the lighter combustion outlet, air will be aspirated into the fuel stream and become mixed therewith.

18 designates a windshield, secured to the top of the lighter casing by soldering, welding, or by screws, for instance; this windshield, if desired, mounting the abradant wheel **20** of the igniter mechanism, as will be seen from Fig. 1, for instance. The windshield **18** is provided with a plurality of openings **19** therethrough. The windshield has been shown as substantially the width of the casing top, as appears from inspection of Fig. 2, so as to surround the outlet end of the valve-and-burner unit assembly, but may be narrowed if desired. One wall of the windshield is provided with an opening **21**, see Fig. 2, so that the member **23** of the valve-and-burner-unit assembly is accessible for adjustment to lengthen or shorten the lighter flame.

22 designates a gas-permeable, flame-sustaining member, mounted in a strap **24**, which extends transversely of and is secured to the inside of the sides of the windshield **18**. This member **22** preferably is composed of a very fine metal mesh and is provided with a tubular shank **26**.

This shank **26** extends into the air-aspirating and mixing chamber **12** to within a short distance of the outlet end of the valve stem bore **10**.

As will be seen from the elevational view of Fig. 1, the member **22** flares outwardly from the top of the shank **26** and, as will be seen from Fig. 2, is provided at its outer end with a slit **28**.

The curved outer end of the mesh member **22** lies slightly below the top of the windshield **18**, as illustrated in Fig. 1.

It will be appreciated that, with the lighter in operation, gas under pressure rushes from valve stem bore **10** and along the interior of the shank **26**. In its flow, the gas, due to its velocity, will aspirate air into the aspirating and mixing chamber **12** through the air-intake ports **14** and **16**, which air enters the gas stream to become mixed therewith. As the air and gas mixture leaves the upper end of the shank **26**, it expands and flows out through the mesh walls of the member **22**, still further to promote mixture of the air and gas.

For purposes of clarity, the mesh of **22** has been shown on a greatly enlarged scale. In actual practice, the mesh is so fine that the interstices are scarcely visible to the naked eye. Consequently, as the gas and air mixture is discharged or expelled through the interstices of **22**, it is broken up into a myriad of tiny streams of thoroughly intermixed gas and air, so that I am always assured of a highly combustible mixture at the outlet of the lighter.

As above pointed out, by providing the member **22** in the gas and air stream, not only is admixing of the gas and air promoted, but the provision of this member **22** facilitates ignition and also promotes retention of the lighter flame.

I have found also that combustion apparently takes place along the entire length of member **22**, so that the base of the main body of the flame is at the burner outlet instead of spaced some distance therefrom as in prior conventional lighters.

As above mentioned, the flame which is produced when my improved construction is employed is blue instead of the usual yellow flame, indicating complete combustion and freedom from carbon.

I have discovered also that, by varying the curvature of the outer end of **22**, I can alter the shape of the lighter flame.

While I have described my invention as applied to a certain unit assembly, it is to be understood that the same may be applied to unit asemblies other than that illustrated within the purview of my invention.

What I claim is:

1. A burner unit assembly for portable lighters of the gaseous fuel type comprising, in combination, means adapted to be inserted into a lighter casing and providing ain air-aspirating and gas and air mixing chamber, a hollow mesh member mounted at the exterior of the outlet end of said chamber, an imperforate tubular shank attached to the inner end of said mesh member and extending into said chamber providing a conduit for the flow of the gas and air mixture from said chamber to said mesh member.

2. A burner unit assembly for installation in the casing of portable lighters of the gaseous fuel type, said unit assembly comprising, in combination, means providing an air-aspirating and gas and air mixing chamber; a hollow mesh member mounted at the exterior of the outlet end of said chamber, said mesh member diverging from the outlet of said chamber and in its outer end being provided with a slot; and an imperforate tubular shank attached to the inner end of said mesh member and extending into said chamber, the walls of said chamber being provided with air intakes therethrough to aspirate air into said chamber as gaseous fuel is rushing therethrough; said shank providing a conduit for the flow of the air and gas mixture to the outlet end of the burner and to said mesh member.

3. A burner unit assembly for insertion into a lighter casing containing a fuel supply; said burner unit assembly comprising means providing an air-aspirating and gas and air mixing chamber adapted to receive fuel from said fuel supply, said chamber being in the form of a tubular member having air intake ports through its walls; a hollow mesh member; and a tubular imperforate shank attached to the inner end thereof and extending with substantial clearance into said chamber, the mesh member diverging from the outer end of the tubular member and being provided in its outer end with a slot whereby, as gaseous fuel is charged into said chamber and is mixed with air aspirated thereinto, the mixture thus created of gas and air will flow through the interstices of the mesh member as well as through the slot in the outer end of the mesh member.

4. A burner unit assembly for a lighter casing containing a fuel supply; said burner unit assembly comprising means providing an air-aspirating and gas and air mixing chamber adapted to receive fuel from the said fuel supply; a hollow mesh member mounted at the exterior of the outlet end of said chamber; an imperforate tubular shank attached to the inner end of the said mesh member and extending into said chamber; and a windshield for said mesh member surrounding said member, the outer edge of the windshield being at least as high as the outer end of the mesh member.

5. A burner unit assembly for the casing of a portable lighter containing a fuel supply, said assembly comprising means adapted to be inserted into the lighter casing and providing an adjustable outlet port and an air-aspirating and gas and air mixing chamber; a hollow mesh member mounted at the exterior of the outlet end of the said chamber and in the path of the gas and air mixture discharging from the outlet end of said chamber; and a windshield for and surrounding said mesh member, and provided with a wall opening to provide access to the first-named means for adjustment of the said outlet port.

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