Dec. 20, 1955 P. W. FELT 2,727,376

PRESSURIZED PYROPHORIC GAS LIGHTER

Filed Feb. 6, 1950 3 Sheets-Sheet 1

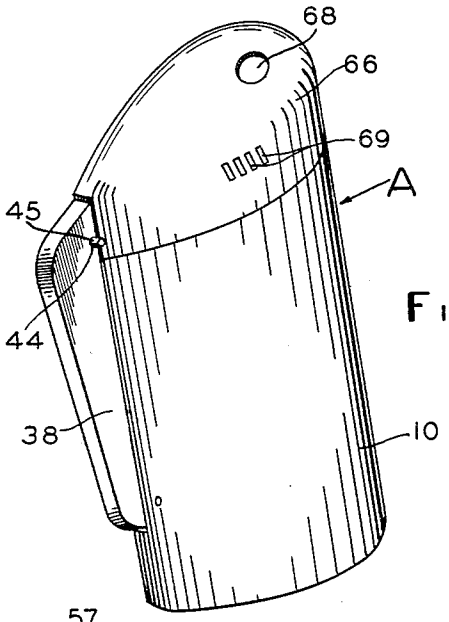


FIG. 1

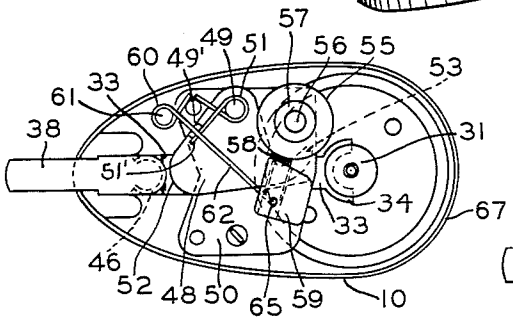


FIG. 2

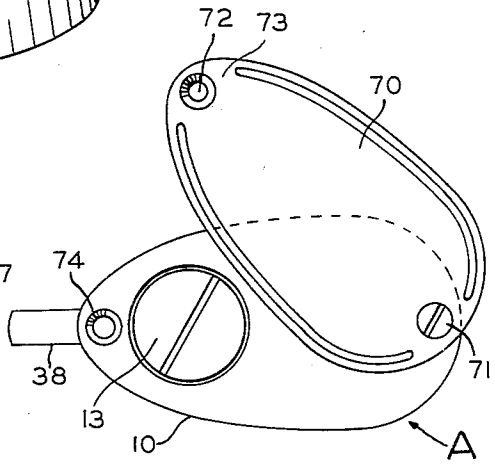


FIG. 3

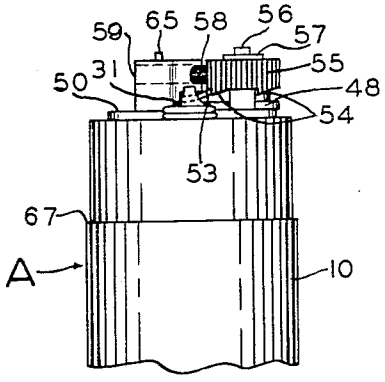


FIG. 4

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PRESSURIZED PYROPHORIC GAS LIGHTER

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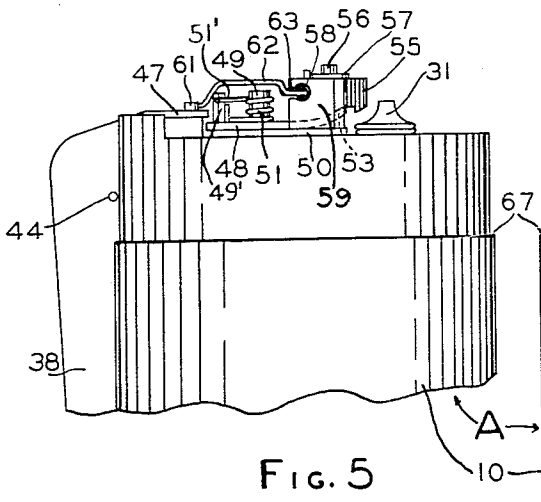


FIG. 5

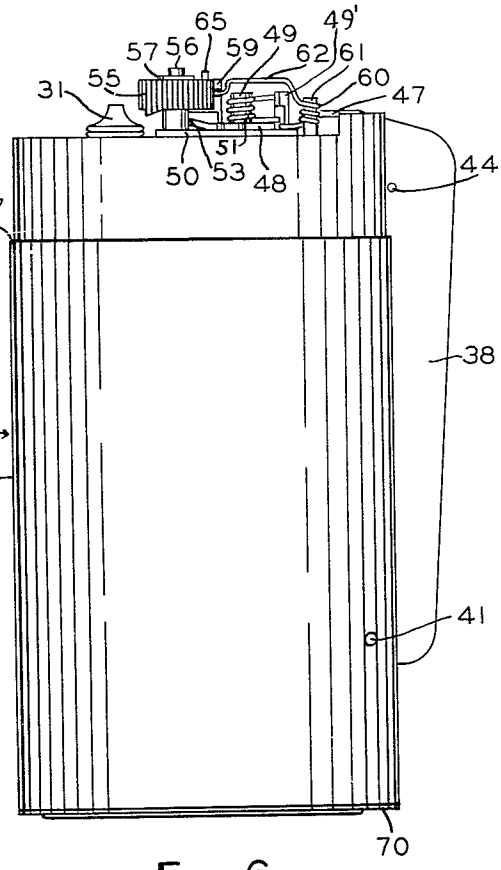


FIG. 6

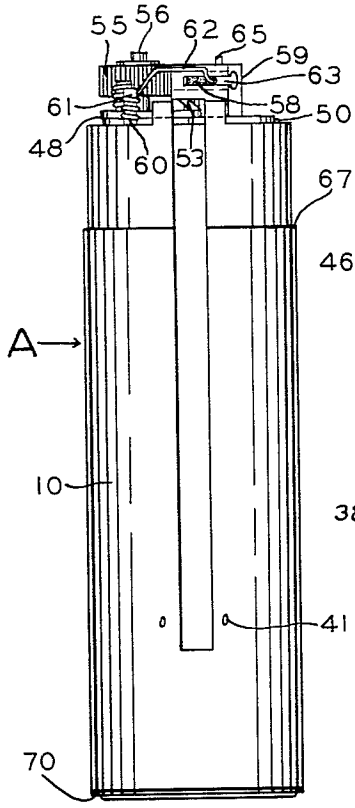


FIG. 7

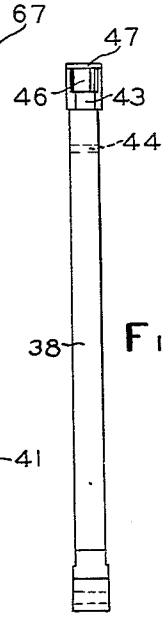


FIG. 8

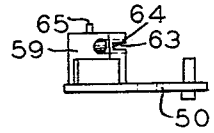


FIG. 9

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PRESSURIZED PYROPHORIC GAS LIGHTER

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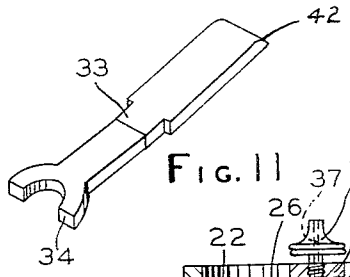


FIG. 11

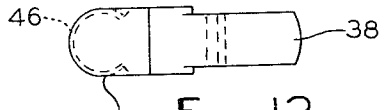


FIG. 12

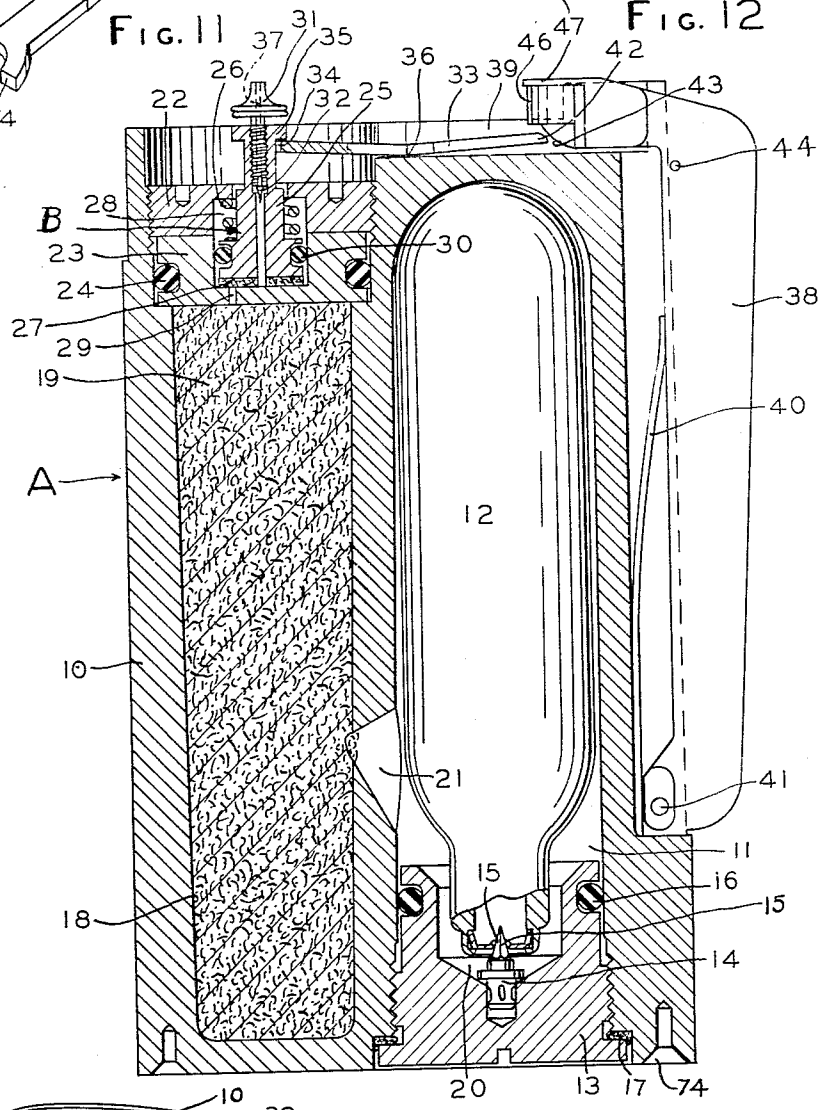


FIG. 10

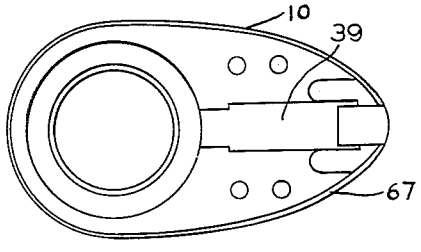


FIG. 13

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2,727,376

PRESSURIZED PYROPHORIC GAS LIGHTER

Paul William Felt, St. Paul, Minn., assignor to Brown & Bigelow, St. Paul, Minn., a corporation of Minnesota

Application February 6, 1950, Serial No. 142,677

9 Claims. (Cl. 67—7.1)

My invention relates to a pressurized pyrophoric gas lighter which may be operated with one hand to ignite the gas simultaneously with the opening of the valve of the lighter and automatically closing the valve by releasing the operating lever.

It is a feature to provide a pressurized gas lighter wherein a removable cartridge containing a liquified fuel is contained, which cartridge may be renewed when the liquified fuel has been discharged therefrom and replaced with a full cartridge. A further feature resides in a pressurized gas lighter having a supply of liquid fuel which may be released when a flame is desired for lighting cigarettes, cigars, pipes and for any other purpose where a flame light is required and which will supply a large number of individual lights over a period of time, thus eliminating the necessity of refilling the lighter as often as was required in old types of petroleum lighters. In this type of lighter no wick is required to carry the fuel adjacent the pyrophoric flint.

It is also an object to provide a lighter wherein by means of a simple hand operated lever, the valve of the lighter is opened and simultaneously a means operates the flint wheel to throw a spark across the nozzle of the valve of the lighter to ignite the escaping pressurized fuel and to maintain the flame of the lighter as long as the operating valve is held compressed. The flame of the lighter automatically goes out when the operating lever is released which permits the valve to automatically close and shut off the supply of pressurized fuel.

It is of primary importance to provide a lighter having a cartridge with liquified fuel contained therein which is sealed and which can be supplied to the user of the lighter so that when a new cartridge is required, it may be qiuckly placed in the lighter and the seal pierced as the cartridge chamber is closed causing the liquified fuel to be directed into a storage chamber in the lighter where the fuel is ready to be released as a gas and automatically ignited by the pyrophoric element.

Thus, this lighter is adapted to be supplied by sealed cartridges which fit into the body of the lighter and which contain a liquified fuel adapted to turn into a gas at atmospheric pressure and room temperature.

A further feature resides in providing a pressurized gas lighter having means for holding a pyrophoric element which is abraded by a serrated wheel lying in a horizontal plane adjacent the outlet of the nozzle of the valve of the lighter, the serrated wheel being operated by a horizontally positioned cam and adapted to be normally retracted by a spring while the pyrophoric element is urged toward the serrated wheel by a long spring arm which forms a resilient means for urging the pyrophoric lighter into contact with the serrated wheel.

It is a further object to provide a valve operating lever having a bifurcated end which is positioned under the shank of the valve and is adapted to be operated by a single lever which first opens the valve and then said lever continues in its movement to operate the horizontal cam to cause a lighting spark to be sprayed over the outlet

of the nozzle of the valve. The horizontal cam is pivoted in a manner to cause the operating lever to exert sufficient pressure to operate the flint wheel with a sudden impulse which causes a large spark from the pyrophoric element over the valve nozzle. Thus, the valve is opened just prior to the operation of the pyrophoric spark by a single lever which lever is held compressed as long as a flame light is desired. Upon releasing the lever, the valve automatically closes, and the lighter goes out. A further feature resides in providing an adjustable spring valve for opening and closing the gas chamber of the lighter. This valve may be adjusted to regulate the height of the flame.

It is also an object to provide a lighter wherein the new cartridge is contained within the cartridge chamber in an upsidedown position, and a closure for this chamber is provided which carries a piercing element so that when a new cartridge is placed in the chamber and the closure member is screwed into place, the piercing element opens the cartridge containing a liquified fuel, the closure having means for sealing the escaping fuel from the cartridge in the lighter and causing it to be directed through an opening extending from the cartridge chamber to the gas chamber. The gas chamber may be filled with an absorbent cotton or other filtering means so as to absorb the liquified fuel and hold it within the fuel chamber ready for passage out of the valve when the same is open.

The simplicity of the construction of my lighter will be quite apparent, not only from the number of parts required, but the arrangement of the parts to provide a lighter with a streamlined appearance and wherein no wick is required having a one-hand operation to open the gas lighter and ignite the same and permitting the flame to remain until the valve is released by the one-hand operation of the operator. Further, I provide a hood for covering the top of the lighter which virtually encloses the working parts which are of a simple construction arranged to operate in a horizontal plane. A flame hole is provided in the top of the hood which causes the flame to be directed out of the opening and carrying the heat away from the working parts such as the flint wheel, the pyrophoric element, and the springs which are positioned under the hood and which hold the operating cam under spring tension as well as the spring means for operating against the pyrophoric element to keep it in contact with the abrading wheel. I have also provided sealing rings made of Buna-N rubber or other similar material not affected by the liquid fuel or the gas therefrom and which automatically seal the joints between the respective parts to prevent any leaking of the liquid fuel or gas out of the lighter.

A further feature resides in a simplified form of valve adapted to be opened when the hand lever is operated by raising the valve through the means of a fulcrum lever. The valve has a needle adjustment which may be set at a predetermined position and which regulates the height of the flame when the valve is opened and the gas is ignited by the pyrophoric flint.

Immediately following the opening of the valve and release of the gas, the pyrophoric spark is directed over the gas nozzle.

These features, together with other objects and details of my lighter will be more fully and clearly hereinafter defined, set forth, and claimed.

In the drawings forming part of this specification:

Figure 1 is a perspective view of my lighter.

Figure 2 is a plan view of the lighter with the hood removed.

Figure 3 is a bottom view of the lighter.

Figure 4 is a side elevation of the top of the lighter, the bottom being broken away, looking toward the valve nozzle.

Figure 5 is an enlarged side view of the top of the

lighter with the hood removed, the bottom portion being broken away.

Figure 6 is a side elevation of the lighter looking in the opposite direction to Figure 5 and showing the hood removed therefrom.

Figure 7 is an edge view looking toward the operating lever.

Figure 8 is an inside view of the operating lever as it appears when removed from the lighter.

Figure 9 is a side view of the flint holding member and base plate which supports the same.

Figure 10 is an enlarged sectional elevation of the lighter.

Figure 11 illustrates a perspective of the fulcrum lever for operating the gas valve.

Figure 12 is an enlarged plan view looking down on the operating lever.

Figure 13 is a plan view of the top of the lighter with the gas valve and operating parts removed.

The gas lighter A is provided with a die cast body portion **10** which may be of any suitable shape and which is shown in the cross section or plan or bottom view in teardrop formation with rounded edge portions making the lighter easy to hold in the operator's hand.

The body **10** is formed with an inner chamber **11** adapted to receive the replaceable gas cartridge **12** which holds a supply of liquified fuel adapted to provide a pressurized gas for the lighter A.

I have found that it is desirable to place the fuel cartridge **12** in an upsidedown position in the lighter A as illustrated in Figure 10 so that the cartridge may be placed in the chamber **11** when the sealing plug **13** is removed. The sealing plug **13** is provided with a piercing element **14**, the point **15** of which pierces the seal of the cartridge **12** as the plug **13** is moved into closed position. When the cartridge **12** is pierced by the point **15**, the liquified fuel and gas escaping from the same is sealed by the O ring sealing washer **16** and the gasket **17** which is positioned around the head of the plug **13**.

An auxiliary gas and filtering chamber **13** is formed in the body **10** of the lighter A adjacent the chamber **11**. This chamber **18** is substantially filled with absorbent cotton or other similar filtering and absorbent material. The chamber **18** is adapted to receive the liquified fuel, and the absorbent cotton **19** acts to absorb and filter the fuel as it passes from the cartridge through the passageway **20**, formed in the inner core portion of the plug **13**, from which passageway the gas and fuel escapes from the cartridge into the chamber **11** and through the passageway **21** into the chamber **18** where the cotton **19** receives the same.

The cotton **19** also acts to prevent the liquid fuel from escaping out of the lighter when the valve of the lighter is opened. It is important that the liquified fuel from the cartridge **12** passes from the chamber **18** in the form of gas rather than liquid. The cotton in the chamber **18** assists in breaking up the liquid into a gas as the liquified fuel expands when it escapes from the cartridge **12** and passes over to the chamber **18**.

The cartridge **12** is filled with a liquified fuel which turns into a gas at atmospheric pressure and room temperature. When the liquified fuel escapes from the cartridge **12**, the inherent pressure in the cartridge forces the liquified fuel into the chamber **18**, and as the fuel expands into said chamber, it turns into a gas which is adapted to provide the supply of fuel for the lighter A which escapes at the top of the lighter through the specially designed valve unit B.

The valve unit B is removably positioned at the top of the chamber **18** and is held in a manner to close the top of said chamber by the screw plug **22**. The member **23** is positioned below the plug **22** and carries an O ring sealing washer **24**. The valve member **25** is held normally closed by the coil spring **26** which causes the valve to seat on the sealing washer **27** fixed at the base of the valve. An axial passageway **28** is formed through the valve **25**, and this passageway communicates with an opening in the washer **27**. A small opening **29** is formed in the member **23** offset from the axial opening **28** and out of which the gas from the chamber **18** escapes when the valve **25** is raised against the spring **26**. I also provide an O ring sealing washer **30** for the valve **25** to prevent the escape of gas from the chamber **18** around the valve **25**. The valve **25** is provided with an adjustable nozzle **31** which is threaded in the top of the axial opening **28** and is formed with a needle point **32** which extends into the passageway **28** and thus the nozzle **31** can be set to regulate the opening out of which the gas fuel escapes from the valve **25**.

The valve **25** is adapted to be operated by the fulcrum lever **33** which is formed with a bifurcated end **34** adapted to fit under the head **35** of the valve **25** so that when the lever **33** is caused to rock on its fulcrum point **36**, the valve **25** is lifted against the spring **26** and gas escapes out of the chamber **18** through the passageway **29**, **28** and the axial opening **37** formed in the nozzle **31**.

In Figure 10, part of the operating mechanism has been removed to more clearly illustrate the fulcrum lever **33** in relation to the hand lever **38**. The top of the casing **10** is formed with a recess **39** in which the fulcrum lever **33** is positioned. The recess **39** is sufficiently narrow to hold the lever **33** in operative alignment with the bifurcated end **34** engaging under the head **35** of the valve **25** (see Figures 10 and 13).

The hand operated lever **38** is held normally in the position illustrated in Figure 10 by the flat spring **40** with the lower end pivoted at **41** in a slot in casing **10** and the upper working end positioned adjacent the free beveled end **42** of the fulcrum lever **33**. Thus, when the lever **38** is engaged by the hand of the operator and pressed inwardly, the beveled edge **43** of the lever **38** will engage against the free beveled end of the lever **33** which causes the lever to raise the valve **25** and permit gas to escape out of the nozzle **31** as long as the lever **38** is held pressed inwardly. As soon as the lever **38** is released, the spring **40** will carry it to the normal position, illustrated in Figure 10, and the valve **25** will automatically close.

As a safety feature, I provide an opening through the lever **44** in the upper portion of the lever **38** which is adapted to receive a small rod or pin **45** so as to prevent the lever **38** from being operated in shipping or packing of the lighter A for shipment. Thus, the pin **45** will hold the lever against operation and prevent gas from escaping from the nozzle **31**. The pin **45** is removed when the lighter is in use and not in the course of shipment or storage.

A hardened steel wearing ring **46** is snapped on to the upper end of the lever **38** positioned just below the flange **47**. The ring **46** is adapted to operate against a cam plate **48** which is pivoted at **49** and which extends horizontally above the plate **50** which is positioned above the lever **33**. The cam plate **48** is formed with the upstanding post member **49'** against which the free end **51'** of the spring **51** bears to urge the plate **48** against the ring **46** of the lever **38**. With the plate **48** pivoted on the post **49** and the spring **51** bearing against the post **49'** the plate **48** is thereby tilted slightly so that the tongue or pawl **53** is spring-urged against a notch or tooth **54** formed on the underside of the wheel **55**, and the pawl **53** withdraws over the tooth as the cam plate **48** returns to the position shown in Figure 2 when pressure on the lever **38** is released. With the plate **48** pivoted on the post **49** the pawl **53** moves in an arc against a tooth **54** of the wheel **55** as the wheel is rotated. The cam plate **48** is held by the coil spring **51** with its cam surface **52** bearing against the wearing ring **46**. The plate **48** has a spring tongue **53** which engages with the shoulders **54** formed on the under surface of the flint wheel **55**. The flint wheel **55** is held on the shaft **56** by the washer member **57** and

is free to be rotated by the cam plate **48** when the lever **38** is pressed inwardly causing the tongue **53** to engage one of the shoulders **54** and rotate the flint wheel to throw a spark from the pyrophoric flint **58** across the nozzle **31** at the same time that the lever **38** opens the valve **25**, thus igniting the escaping gas from the nozzle **31**.

The plate **50** is mounted on the casing **10** above the lever **33** and is adapted to support the flint receiving housing **59**. The coil spring **60** is mounted on the pin **61** and is formed with a spring arm **62** which extends through the slot **63** in the flint housing **59** so as to bear against the rear end of the pyrophoric flint **58** pressing the same against the sharp teeth of the flint wheel **55**. A shoulder **64** stops the free end of the arm **62** when the flint **58** is virtually worn out, whereupon the spring arm **62** can be removed from the slot **63** and caused to rest against the pin **65** while a new flint is placed in the flint housing **59**. The spring arm **62** can then be placed against the rear of the flint to cause the flint to operate against the flint wheel by the spring tension of the spring **60**.

A hood **66** is provided to cover the working parts of the lighter A as illustrated in Figure 1. The hood **66** slides down over the top of the body **10** of the lighter A with its lower edge resting against the shoulder **67**. The hood fits frictionally on the upper end of the body **10** of the lighter A and forms a finishing cover for the working parts such as the cam plate **48**, the springs **51** and **60**, the flint housing, the flint wheel, the fulcrum lever **33**, and the nozzle **31** as well as the working end of the lever **38**. The hood **66** is formed with an opening **68** for the flame of the lighter A, and a series of air openings **69** are provided in the sides of the hood to admit air so that the flame from the nozzle **31** will burn above the hole **68**. The hood gives a clean, smooth appearance to the top of the lighter and encloses the working parts so that the pyrophoric flint **58** may throw lighting sparks over the nozzle **31** without interference of air draft and thus insuring the operation of the lighter when the lever **38** is pressed inwardly. So long as the lever **38** is held pressed in, the lighter will burn with a flame extending out of the hole **68**. The moment the lever **38** is released, the flame will go out and the gas will cease to escape out of the nozzle **31**.

It is an important feature of my lighter that the flint wheel extends in and operates in a horizontal position and is operated by the lever which simultaneously operates the gas valve **25**. This simple construction provides a very desirable lighter wherein the gas cartridge **12** can be replaced at any time. The pressurized fuel in the cartridge **12** is of a sufficient volume to provide many thousands of lights for the lighter so that the fuel cartridge **12** does not have to be replaced very often. The gas valve is unique in its simple form and is formed in a unit so that it can be readily removed if desired or placed in regular position to operate. It is also an important feature that the cartridge **12** may be readily replaced through the removal of the plug **13**.

I have provided a closure plate **70** for the bottom of my lighter A which may be pivoted on the screw **71** when the screw from the opening **72** is removed or when the free end **73** of the plate **70** is moved to one side as illustrated in Figure 3. The portion **72** of the plate may be countersunk so as to fit in the countersunk opening **74** to hold the plate normally in position to cover the bottom of the lighter A and the plug **13**.

The lighter is made so that any of the parts may be readily replaced which also facilitates the assembly of the parts that make up the lighter and also simplifies the construction of the same.

While the invention has been described in a particular form with the arrangement of the parts as illustrated in the drawings, I desire to have it understood that variations may be made in the construction and form of the lighter within the scope of the following claims without parting from the purpose and intent of the invention.

I claim:

1. A pressurized pyrophoric gas lighter consisting of a body, a cartridge chamber, a gas expansion and filter chamber, a removable plug for closing said cartridge chamber having a piercing element for piercing the fuel cartridge placed in said chamber, a removable valve unit closing said gas expansion chamber, a toothed horizontally disposed abrasive wheel mounted on a vertical shaft, a pyrophoric flint contacting said wheel under spring tension, a valve opening fulcrum lever, a pivoted horizontal cam having a tongue formed thereon adapted to engage said toothed wheel and a depressible hand operated lever pivoted to said body adapted to engage said valve lever to open said valve and simultaneously operate said cam to rotate said abrasive wheel against said flint to ignite the fuel gas escaping from said valve, a flame being maintained as long as said hand lever is depressed and gas is released from said valve.

2. A lighter adapted to contain a replaceable cartridge of liquid fuel which turns into gas at atmospheric pressure and room temperature comprising a casing, a cartridge of compressed liquid fuel, screw plug means formed in said casing for piercing said cartridge, a gas expansion chamber for receiving the liquid fuel from said cartridge, a replaceable adjustable gas escape valve, a pyrophoric igniting means including a flint, a flint wheel horizontally mounted on a vertical shaft secured to said casing, a cam plate horizontally mounted on said casing having a tongue member adapted to engage said flint wheel; a fulcrumed lever for lifting said valve, and a hand lever having cam surfaces adapted to actuate said cam plate and said fulcrumed lever to ignite gas issuing from said valve.

3. A pressurized pyrophoric gas lighter including a casing, a cartridge containing a supply of liquified fuel under pressure, means for piercing said cartridge to allow the fuel to escape therefrom, a gas expansion chamber having a filter compound therein, a valve unit connected to said gas expansion chamber and including a valve for closing the gas chamber, an adjustable nozzle carried by said valve to regulate the escaping gas through said valve, means for sealing said valve unit in place, a horizontal fulcrum lever pivoted on the top of said casing for lifting said valve to open the same, a pyrophoric lighting means, a horizontally disposed cam for operating said lighter means pivotally mounted on the top of said casing, and a single hand operated lever having cam surfaces formed thereon adapted to actuate said fulcrum lever to open said gas valve and virtually instantly thereafter actuate said cam for operating said pyrophoric lighter means to ignite the escaping gas from said gas chamber.

4. A pressurized pyrophoric gas cigarette lighter including a casing, a pyrophoric spark means including a flint abrading wheel mounted on a vertical shaft mounted on said casing, a nozzle valve mounted in said casing, a hand operated lever pivotally mounted on said casing having a bevelled edge and an arcuated surface formed on the upper end thereof, a horizontally disposed fulcrum lever mounted on the top of said casing, the forward end of the same adapted to engage said nozzle to lift the same, said fulcrum lever positioned so that the rear end thereof is engaged by said bevelled edge of said lever, a cam plate pivotally mounted on the top of said casing and movable by said arcuated surface of said hand lever adapted to operate said spark means, said casing having a plug formed with piercing means adapted to pierce a cartridge of compressed gas placed in said casing when said plug is secured to said casing.

5. In a pressurized pyrophoric gas cigarette lighter, a casing, an outlet valve nozzle mounted in said casing, a fulcrumed lever mounted to rock on the top of said casing and in engagement with said nozzle, a pivotally mounted hand lever having a portion thereof for contact engagement with said fulcrumed lever to rock the same for opening said nozzle, a cam plate pivotally mounted on said

casing, and shoulder means on the outer free end of said hand lever positioned to directly contact and operate said cam plate as said fulcrumed lever is actuated by said hand lever.

6. A pressurized cigarette lighter using liquified petroleum fuel including a casing, an outlet valve nozzle mounted in said casing, a valve lifter bar mounted on top of said casing in a manner to lift said valve nozzle, a hand lever pivotally mounted on said casing, means formed on the upper end of said hand lever for depressing one end of said valve lifter bar to lift open said nozzle, a flint wheel mounted on said casing adjacent said nozzle, a flint mounted on said casing, a cam plate pivotally mounted on said casing and having a tongue member adapted to engage and rotate said flint wheel, means formed on the upper end of said hand lever to engage said cam plate and operate said flint wheel moving the same virtually simultaneously with the opening of said nozzle to shower sparks over said nozzle to ignite gas issuing therefrom.

7. A pressurized gas lighter having a casing for holding the liquid fuel under pressure which when released is in the form of a gas, a burner nozzle on the top wall of said casing, a horizontally disposed pyrophoric means including a flint wheel mounted to rotate in a horizontal plane, a cam plate having a tongue portion for engaging the lower surface of said flint wheel to rotate the same, a horizontally disposed rocker lever having one end engaging beneath said nozzle and in position to open the valve of the lighter to permit gas to escape through said nozzle, said cam plate being disposed above said rocker lever, a hand pivoted to the side of said casing and having cam surfaces on the free end thereof for operating said rocker lever and said cam plate simultaneously to open said nozzle and project a spark over the same, and a spring for normally holding said lever in inoperative position.

8. A pressurized fuel cigarette lighter, a casing, a pyrophoric lighting means including a flint wheel adapted to rotate in a horizontal plane and flint mounted on the top of said casing, a gas nozzle mounted on said casing adjacent said pyrophoric means, a cam plate pivotally mounted on said casing and having one end adapted to engage beneath said flint wheel to rotate the same, a valve lifting lever lying horizontally on the top of said casing below

said disposed cam, and a hand operated lever adapted to simultaneously operate said cam and said valve lifting lever in a single operation whereby when said hand lever is operated, gas is caused to escape from said casing out of said nozzle and is simultaneously ignited by said pyrophoric means.

9. In a pyrophoric gas cigarette lighter, a casing for receiving liquified fuel under compression, a single compressible hand lever having an upper free end pivotally mounted on said casing, an escape valve mounted on said casing, a toothed flint wheel mounted on said casing adjacent said escape valve, a flint mounted in contact with said flint wheel, a cam plate pivotally mounted on said casing having an upstanding member formed thereon, said cam plate having a pawl member formed thereon for engagement with a tooth of said wheel, a spring mounted on said casing and urged against said upstanding member to urge said cam plate upward against said hand lever and to tilt said cam plate slightly whereby said pawl is urged against the under side of said wheel and against a tooth thereof, said free end of said hand lever pivotally engagable with said cam plate, a free fulcrumed lever positioned on said casing with one end under said valve for lifting the same and the other end depressible by said upper free end of said hand lever, when said hand lever is depressed to actuate said cam plate to produce sparks over said escape valve.

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