Nov. 26, 1968 R. S. PIFFATH ETAL 3,413,070

GAS LIGHTER

Filed June 28, 1966

FIG. 1.

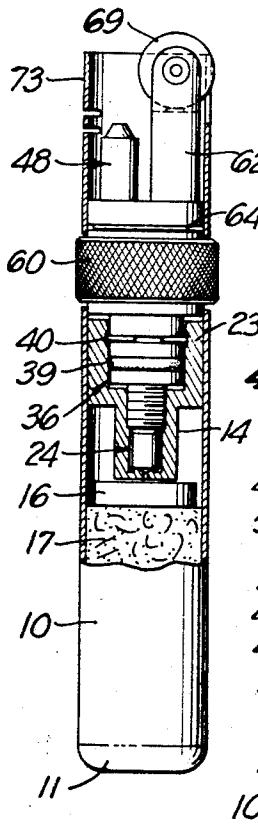


FIG. 2.

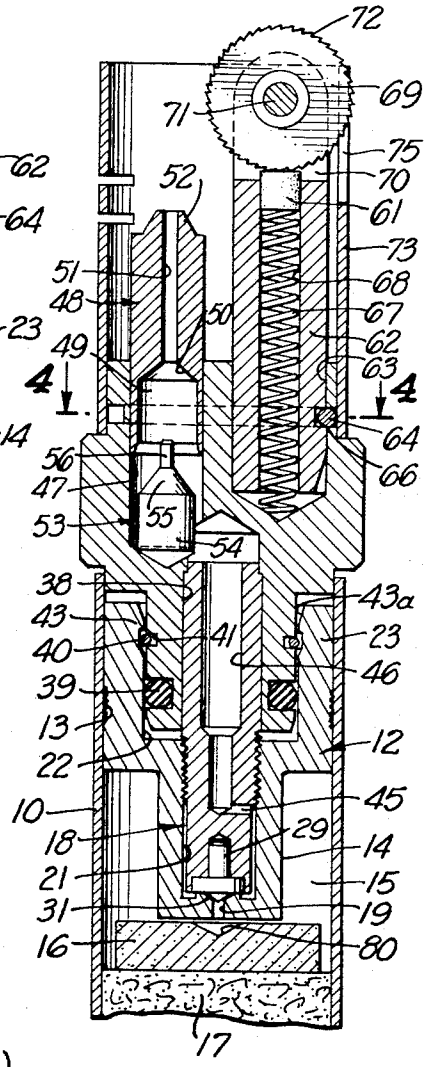


FIG. 3.

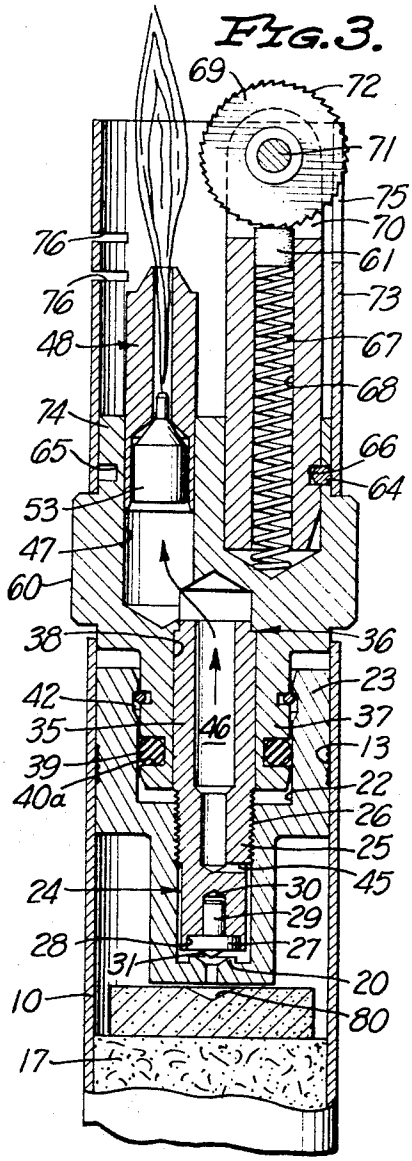
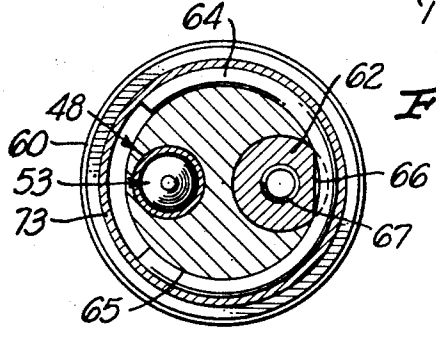


FIG. 4.



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6 Claims. (Cl. 431—89)

ABSTRACT OF THE DISCLOSURE

A lighter adapted to burn a gaseous fuel of the liquefied petroleum type. The lighter includes a container for the liquefied gaseous fuel and includes a valve operating member threadedly connected to the container to regulate the flow of gaseous fuel therefrom. The operating member carries a burner and a device for igniting the gaseous fuel emanating from the burner. A common retainer secures the igniting device to the operating member, and also secures a wind guard thereto. A check valve in the gaseous fuel passage through the operating member responds to an excessive rate of flow to reduce such rate.

Summary and objects of invention

The present invention relates to lighters, and more particularly to lighters adapted to burn a liquid petroleum gas as a fuel, such as butane.

An object of the invention is to provide a lighter capable of containing a liquid gas producing fuel under pressure, such as butane, and embodying a single valve mechanism for shutting off the fuel supply to the burner of the lighter, for adjusting the size of the burner flame, and for refilling the lighter with liquid fuel under pressure from a suitable source.

Another object of the invention is to provide a lighter of the type above indicated, which is easy to ignite, safe to operate, and which automatically reduces the size of the gas flame in the event of its becoming excessive.

A further object of the invention is to provide a gas lighter adapted to contain a liquid petroleum gas under pressure, such as butane, which is reliable in its operation, possesses a minimum number of parts, resulting in its simplicity and economical production, and of strong and sturdy construction.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of a form in which it may be embodied. This form is shown in the drawings accompanying and forming part of the present specification. It will now be described in detail, for the purpose of illustrating the general principles of the invention; but it is to be understood that such detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Description of drawing

Referring to the drawing:

FIG. 1 is a side elevational view, with parts shown in section, of a lighter embodying the invention;

FIG. 2 is a longitudinal section, on an enlarged scale, through the upper portion of the lighter disclosed in FIG. 1, with its valve mechanism closed;

FIG. 3 is a view similar to FIG. 2 illustrating the lighter in its open and operating condition;

FIG. 4 is a section taken along the line 4—4 of FIG. 2.

Description of exemplary embodiment of invention

The device illustrated in the drawing is a lighter adapted to burn a gas derived from a liquid petroleum fuel under pressure, such as butane or propane. Such liquid fuel under pressure, which will be partially in a gaseous state, is disposed within a suitable pressure vessel or container **10**, which is preferably of cylindrical shape, closed at its lower end by an end closure or plug **11** and at its upper end by an upper plug or valve body **12**, the lower and upper plugs being suitably secured to the cylindrical portion of the container in leakproof relation by a suitable adhesive, such as an epoxy resin, which may be disposed in circumferential grooves **13** in the plug periphery for adherence to the wall of the cylindrical container. The lower portion **14** of the upper plug or valve body has a lesser external diameter than its upper portion to provide an annular space **15** with the cylindrical container. Located below the lower end of the valve body is a retainer member or disc **16** having a lesser diameter than the inside diameter of the container, this disc resting upon the upper end of a foamed plastic **17**, such as an open cell polyurethane foam, which substantially completely fills the storage area or chamber of the container **10** between its bottom pug **11** and the retainer **16**. The mass of polyurethane foam serves to limit the rate of escape of the gas in the container resulting from vaporization of the liquid fuel when the valve mechanism **18**, of which the valve body **12** forms a part, is in an open condition.

The lower end of the valve body has a central inlet port **19** surrounded by an upwardly facing tapered valve seat **20**, the port opening into a central passage **21** in the lower portion **14** of the body, which, in turn, opens into an enlarged counterbore **22** in the upper portion **23** of the valve body. A valve stem **24** has an externally threaded portion **25** meshing with companion internal threads **26** in the valve body, this stem carrying a valve head **27** in its lower portion fitting within a lower stem socket **28**, an axial rod portion **29** of the head being disposed within a companion bore **30** in the stem. The valve head has a tapered flow restricting portion **31** depending from the main part of the head, which is adapted to be disposed in various relative positions with respect to the tapered seat **20**, so as to control the flow of gas passing through the inlet **19** and into the valve body. The valve head **27** may be made of a suitable elastic material, such as nylon. Its main portion surrounding its tapered flow restricting part **31** may engage the upper end of the seat **20** to fully close the inlet. When the valve stem **24** is threaded upwardly within the valve body **12**, the tapered portion **31** of the head **27** can be spaced at various distances from the tapered valve seat **20** to regulate the rate of flow of gas through the inlet **19** and into the valve body.

The valve stem **24** has an upper portion **35** mounted within and secured to a burner supporting and valve operating body member **36** having a lower reduced diameter portion **37** piloted within the counterbore **22** of the upper plug or valve body **12**. The upper portion **35** of the

valve stem may be knurled or roughened on its exterior so that, when forced into a companion bore **38** in the member **36**, the member **36** and stem **24** will be firmly secured to one another. Leakage of fluid between the two body members **36**, **12** is prevented by a suitable seal **39**, such as a rubber or rubber-like O-ring, mounted in a peripheral groove **40***a* in the reduced diameter portion **37** of the member **36** and slidably and sealingly engaging the wall of the counterbore **22**. The stem **24** and supporting member **36** are assembled within the valve body by inserting them into the latter and threadedly securing the stem within the valve body **12**, the parts being held in assembled relation by a split expansible snap retainer ring **40** mounted in a peripheral groove **41** in the pilot portion **37** of the member **36** and adapted to snap outwardly partially into an internal circumferential groove **42** in the valve body. The upper end **43** of the valve body is tapered or flared to facilitate insertion of the main body member **36**, its seal ring **39**, and retaining ring **40** into the valve body **12**, the internal groove **42** having a length substantially longer than that of the cross sectional diameter of the snap retainer ring **40** to permit limited longitudinal movement of the supporting member **36** and valve stem **24** relative to the valve body **12** in controlling the valve mechanism **18**. The upward limit of travel of the parts within the valve body is determined by engagement of the ring **40** with an upper groove shoulder **43***a* normal to the axis of the parts, and which will, therefore, prevent their disassembly.

The gas flowing through the inlet **19** and into the lower space **21** of the valve body **12** can pass through a side port **45** in the valve stem **24** into its central passage **46** thereabove, the upper end of this passage communicating with the upper portion of the bore **38** of the main supporting member **36** which communicates with its offset passage **47** in which the lower end of a burner member **48** is received and suitably secured to the supporting member **36**. This burner member has a lower passage **49** of large diameter that terminates at a tapered seat **50**, from which a reduced diameter passage or outlet **51** extends to the upper end or tip **52** of the burner member. The exterior of the tip **52** tapers in an upward direction to coact with a liquid butane filling can (not shown), or other source of fuel, when the lighter is to be recharged with fuel. The gas discharging from the outlet **51** can be ignited and will burn at the tip.

For the purpose of preventing the continued existence of too large a gas flame projecting from the tip **52**, a safety check valve **53** is incorporated in the apparatus. As disclosed, a piston type of valve is disposed within the passage **47**, this valve being hollow to decrease its weight and having a lower cylindrical portion **54** and an upper tapered portion **55** from which a pin or stem **56** projects. The included apex angle of the tapered portion **55** is slightly less than the included angle of the frustoconical seat **50** in the burner member **48** such that the upward movement of the piston check valve **53** to engage its tapered portion **55** with the tapered seat **50** still permits a restricted quantity of gas to flow between the tapered parts and around the stem **56** piloted within the reduced diameter outlet **51** for burning at the tip **52**. This valve **53** is moved automatically upwardly in the event the velocity of gas flow exceeds a predetermined value. Upon reduction of the velocity of gas flow, the piston check valve **53** drops back to its lower position illustrated in FIG. 2 to permit gas to flow therearound and through the outlet **51** of the burner, the rate of gas flow being determined by the adjustment of the valve stem **24** and its head **27** relative to the valve seat **20**.

The open or closed condition of the lighter is determined by rotating the supporting member **36**, as by grasping its knurled head **60**, which will turn the stem **24** and feed the latter and its valve head **27** axially of the valve body **12**. With the valve **18** in an open condition, the gas flowing therethrough and from the burner outlet **51** can be ignited by a spark derived from a flint **61** slidably mounted within a flint post **62** disposed within a socket **63** in the upper end of the main supporting member **36**, this post being retained in the socket by a retainer ring **64**, such as a C-ring, mounted within a peripheral groove **65** in the main supporting member above its knurled head **60** and disposed within a transverse groove **66** cut in one side of the lower portion of the flint post **62**. A helical compression spring **67** is disposed in a central passage **68** through the flint post, its lower end bearing against the base of the supporting member bore **63** and its upper end against the flint **61**, urging the latter in an outward direction. The spark is generated by rotating a striker wheel **69** disposed in a slot **70** extending across the upper end of the flint post and mounted upon a shaft **71** secured to the post. Turning of the striker wheel **69** will force its teeth or knurls **72** on the periphery of the striker wheel against the flint **61**, the spark being projected toward the gas emanating from the burner tip **52** to effect ignition of the latter.

A wind guard **73** surrounds the burner portion **48** of the gas lighter and the flint post **62**. This guard has its lower portion disposed over the upper portion **74** of the supporting member **36**, being frictionally held in place by engaging the C-ring retainer element **64**. The guard has an upper slot **75** through which the striker wheel **69** extends, and also one or a plurality of slots **76** adjacent to the burner tip **52** through which secondary air can pass for assisting in the complete combustion of the gas emanating from the tip.

When the lighter is not in use, its supporting member **36** is disposed in a position to firmly engage the nylon head **27** with the valve seat **20** so as to prevent the escape of gas from the container **10**. When the lighter is to be used, the knurled head **60** is grasped and rotated, as in a counterclockwise direction, assuming a right-hand threaded connection **25**, **26** between the valve stem **24** and valve body **12**, which will shift the valve stem outwardly of the valve body and remove the nylon head **27** from its companion seat **20**. The gas, which is usually at the upper end of the container **10**, with the fuel still remaining in its liquid state therebelow, will flow around the retainer or spacer member **16** and in through a transverse groove **80** in the latter into the inlet **19**, passing between the valve seat **20** and head **27** into the valve body space **21**, and through the side port **45** and central passage **46** into the member passages **38**, **47**, flowing around the safety check valve **53** and through the outlet **51**. The striker wheel **69** can be rotated in the proper direction to produce a spark that will ignite the gas. Upon its ignition, the knurled head **60** can be appropriately turned to adjust the valve **18** and secure a flame of the desired length at the burner tip **52** by appropriately spacing the tapered valve portion **31** of the valve head with respect to its companion tapered seat **20**. In the event the valve **18** has been opened too far initially, the spark will ignite the gas, producing a flame of too great a size. Under such conditions, the velocity of flow of the gas through the passages **46**, **38**, **47** will carry the piston check valve **53** upwardly into engagement with the tapered portion **50** of the burner, immediately restricting the flow of gas and automatically reducing the size of the gas flame. The turning of the knurled head **60** in the appropriate direction to reduce the effective area through the valve seat **20** will allow the check valve **53** to drop back to its initial position.

In the event the fuel supply becomes exhausted, the container **10** can be recharged with liquid petroleum fuel under pressure, such as liquified butane, merely by turning the knurled head **60** to remove the valve head **27** from its seat **20** and by placing the refilling spout (not shown) of a butane source (not shown), which is of a known type, against the tapered tip **52** and in sealed relation therewith, after which the valve mechanism of the fuel source is opened, the liquid fuel passing downwardly

through the outlet **51** and the passages **47, 38, 46, 45** into the valve body, continuing through the valve seat **20** and inlet **19** into the container **10**, until the latter has received a suitable quantity of fuel, whereupon the knurled head **60** is turned to close the valve **18** and the source (not shown) disengaged from the tip **52**.

It is apparent that a comparatively simple liquefied petroleum gas lighter has been provided, which is of strong and sturdy construction, and which can operate to provide a gas flame of the desired size. In the event the flame becomes inordinately great, it is automatically reduced in size because of the throttling action provided by the safety check valve **53**. A single valve **18** is available for shutting off the fuel supply, and for adjusting the rate of flow of gas from the container **10**, as well as for effecting recharging or refilling of the container with additional fuel.

Although an exemplary embodiment of the invention has been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined by the claims which follow.

We claim:

1. In a gas fueled lighter:
(a) a container adapted to retain under pressure gaseous fuel of the liquefied petroleum type;
(b) a valve body secured to said container and having an inlet communicable with the fuel in said container;
(c) a valve stem threadedly mounted in said body and rotatable with respect thereto to regulate the flow of gaseous fuel through said inlet, said stem having a passage for receiving gaseous fuel passing through said inlet;
(d) an operating member secured to said stem for rotating said stem in said valve body to regulate the flow of gaseous fuel through said inlet and having a passage communicating with said stem passage;
(e) said operating member having burner means thereon providing an outlet for gaseous fuel from said member passage;
(f) means on said operating member adjacent to said burner means for igniting the gaseous fuel discharging from said outlet; and
(g) means responsive to an excessive rate of flow of gaseous fuel through said member passage for reducing said rate of flow.

2. In a gas fueled lighter:
(a) a container adapted to retain under pressure fuel of the liquid petroleum type;
(b) a valve body secured to said container and having an inlet communicable with the fuel in said container;
(c) a valve stem adjustably mounted in said body to regulate the flow of gaseous fuel through said inlet, said stem having a passage for receiving gaseous fuel passing through said inlet;
(d) an operating member secured to said stem for adjusting said stem in said valve body and having a passage communicating with said stem passage;
(e) said operating member having burner means mounted thereon providing an outlet for gaseous fuel from said member passage;
(f) a post in said operating member and extending upwardly therefrom;
(g) retaining means securing said post to said operating member;
(h) said post being adapted to hold a flint adjacent to said burner outlet;
(i) a striker wheel rotatably mounted on said post and engageable with the flint to produce a spark directed toward the gaseous fuel discharging from said outlet; and
(j) a wind guard surrounding said operating member, burner means and post, said guard engaging said retaining means to be attached thereby to said operating member.

3. In a gas fueled lighter:
(a) a container adapted to retain under pressure fuel of the liquid petroleum type;
(b) a valve body secured to said container and having an inlet communicable with the fuel in said container;
(c) a valve stem adjustably mounted in said body to regulate the flow of gaseous fuel through said inlet, said stem having a passage for receiving gaseous fuel passing through said inlet;
(d) an operating member secured to said stem for adjusting said stem in said valve body and having a passage communicating with said stem passage;
(e) said operating member having burner means mounted thereon providing an outlet for gaseous fuel from said member passage;
(f) a post in said operating member and extending upwardly therefrom, said post having a transverse groove;
(g) said operating member having a peripheral groove;
(h) a retainer ring in said peripheral groove extending into said transverse groove to secure said post to said operating member; and
(i) a wind guard surrounding said operating member, burner means, post and retainer ring and engaging said ring to be attached thereby to said operating member.

4. In a gas fueled lighter:
(a) a container adapted to retain under pressure fuel of the liquid petroleum type;
(b) a valve body secured to said container and having an inlet communicable with the fuel in said container, said body having a valve seat surrounding said inlet;
(c) a valve stem threadedly mounted in said body and having an elastic head engageable with said seat to close said inlet, said head having a tapered portion adapted for axial movement with respect to said seat in response to rotation of said stem in said valve body for regulating the flow of gaseous fuel through said inlet;
(d) said body having a chamber into which gaseous fuel flowing through said inlet can discharge;
(e) said stem having a passage communicating with said chamber for receiving gaseous fuel therefrom;
(f) an operating member secured to said stem for rotating said stem in said valve body and having a passage communicating with said stem passage;
(g) a burner mounted in said operating member and extending upwardly therefrom and having an outlet communicating with said operating member passage through which gaseous fuel from said member passage can discharge;
(h) a post in said operating member and extending upwardly therefrom, said post having a transverse groove;
(i) said operating member having a peripheral groove;
(j) a retainer ring in said peripheral groove extending into said transverse groove to secure said post to said operating member; and
(k) a wind guard surrounding said operating member, burning means, post and retainer ring and engaging said ring to be attached thereby to said operating member.

5. In a gas fueled lighter:
(a) a container adapted to retain under pressure gaseous fuel of the liquefied petroleum type;
(b) a valve body secured to said container and having an inlet communciating with said container and terminating in a valve seat;
(c) a valve element movable toward and away from said valve seat to regulate the flow of gaseous fuel through said inlet;
(d) operating means carrying said valve element and

threadedly connected to said valve body for moving said valve element toward and away from said valve seat in response to rotation of said operating means relative to said valve body;

(e) said operating means having a passage therethrough which communicates with said inlet when said valve element is spaced from said valve seat;

(f) means responsive to an excessive rate of flow of gaseous fuel through said passage for reducing said rate of flow;

(g) burner means communicating with said passage; and

(h) means for igniting gaeous fuel emanating from said burner means.

6. A gas fueled lighter according to claim **5** wherein

said means responsive to an excessive rate of flow comprises a check valve seat in said passage and includes a check valve in said passage movable into engagement with said check valve seat by an excessive rate of flow of gaseous fuel through said passage.

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