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BURNER VALVE WITH IMPINGING MEANS

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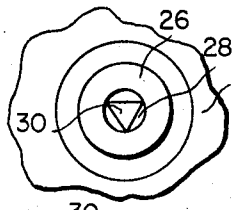

FIG. 3

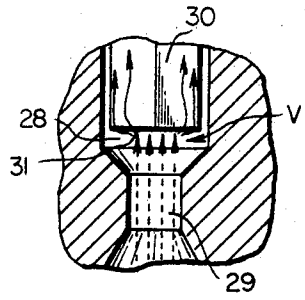

FIG. 6

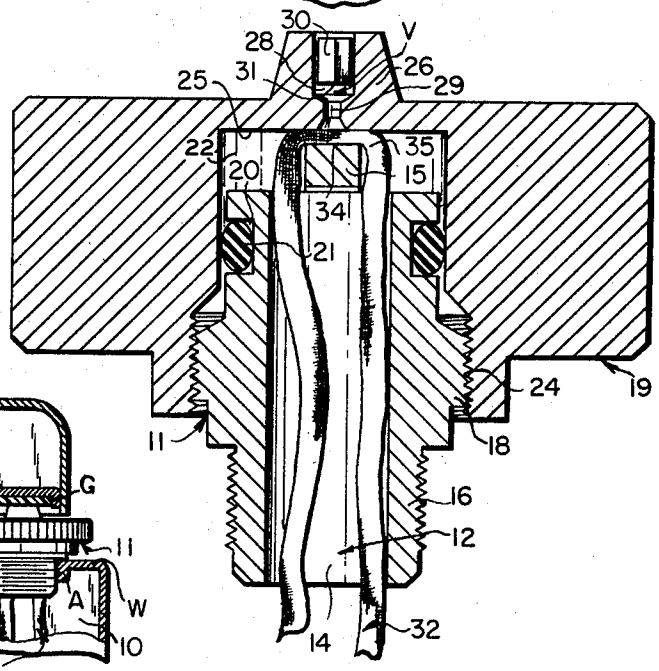

FIG. 2

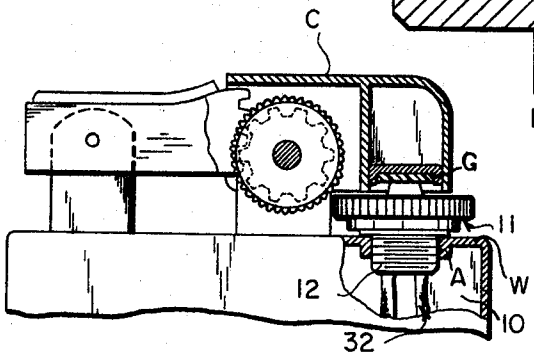

FIG. 1

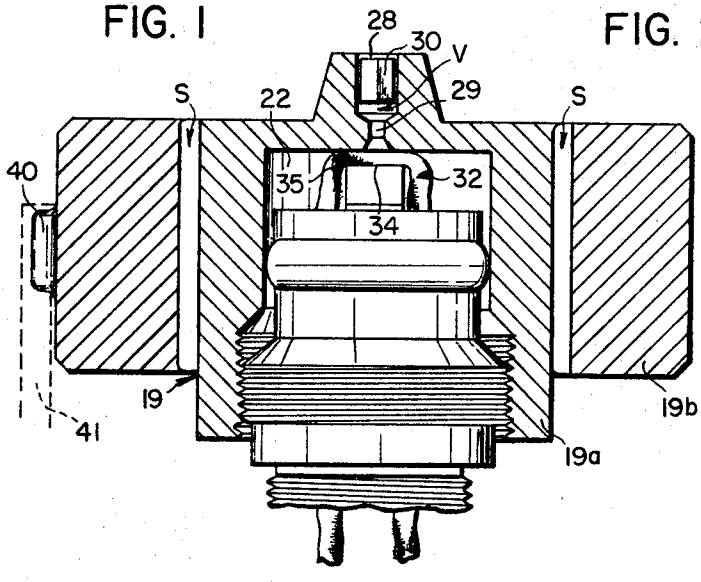

FIG. 5

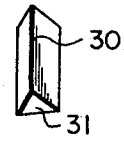

FIG. 4

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BURNER VALVE WITH IMPINGING MEANS

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ABSTRACT OF THE DISCLOSURE

The present invention is directed to a burner valve construction for gas fuel lighters that includes a flame height adjustment wheel having a gas escape orifice and a restricted evaporation orifice formed therein, said orifices being in communication with each other, and an impinging means positioned within the gas escape orifice above the gas evaporation orifice so that when the manually operable, exteriorly positioned closure member is opened the fuel that is being emitted from the reservoir is directed upwardly against the impinging means for defusing any droplets of liquid fuel that may be present, thereby accomplishing complete evaporation prior to emission from the exterior extremity of the gas escape orifice.

Background of the invention

Gas fueled lighters having a reservoir for containing liquid fuel having a low evaporation temperature at atmospheric pressure are well known in the art. For satisfactory performance it has been found that burner valves for such lighters must provide for the evaporation of all of the liquid fuel before it is emitted from the burner outlet for ignition. This is because failure to do so causes erratic ignition and burning of the fuel-air mixture, since any small droplets of liquid fuel remaining within the fuel mixture emitted from the burner outlet will ignite with sudden violent explosions within the major flame of the lighter.

Prior art burner valves have approached the solution of this problem by positioning the evaporation zone at a considerable distance inwardly of the exterior portion of the burner outlet. With the use of the long vaporization zones of prior art gas fueled burner valves, however, a substantial amount of liquid fuel could accumulate within this vaporization zone when the burner outlet was closed and not used for a considerable period of time. On subsequent ignition, this caused a large initial flare-up which produced a hazardous condition.

This invention overcomes the problems associated with such prior art burner valves by providing a structure which can utilize an extremely short vaporization zone in which a stationary impingement surface is provided to insure complete evaporation of the fuel spray being emitted from the wicking means prior to leaving the burner valve. This eliminates the initial flare-up normally encountered with previous gas fueled lighters during ignition.

Summary of the invention

The burner valve structure of the present invention includes: (1) a burner stem adapted to be fitted into a lighter casing and having a central passage therein communicating with the reservoir which contains therein liquified gaseous fuel under pressure; (2) a flame height adjustment wheel that is rotatably mounted on the burner stem; (3) a wicking means carried on a supporting anvil positioned between the burner stem and the adjustment wheel so that the flow of fuel may be regulated; (4) an orifice formed in the adjustment wheel that leads from a portion of the wick adjacent the lower end of said orifice to the atmosphere when open; (5) an impingement block positioned in said orifice; and (6) an exteriorly positioned manually operable, valve closure member.

The impingement block is located so that the atomized spray released from the wicking means is directed against the bottom surface of said block to diffuse any droplets of liquid fuel and to allow sufficient time for the vaporization of the diffused droplets of liquid fuel contained in the atomized spray prior to its escape from the burner structure. Therefore, it can be seen that the fuel is atomized, diffused and then completely evaporated to gaseous form before it reaches the exterior extremity of the burner.

These and other features of the present invention are more clearly apparent upon consideration of the following specification and accompanying drawings wherein like characters designate corresponding parts throughout and in which:

Brief description of the drawing

FIG. 1 is a partially sectioned, elevational view of the upper portion of the gas fueled lighter of the present invention showing the burner valve in sealed position by virtue of the releasable exteriorly positioned closure member being seated on the upper extremity of the burner structure;

FIG. 2 is an enlarged, cross-sectional view of the burner valve of FIG. 1;

FIG. 3 is a partial top plan view of the burner valve of FIG. 2 showing the location of the impingement block in the burner valve orifice;

FIG. 4 is a perspective view of the impingement block used in the burner valve of the present invention;

FIG. 5 is a cross-sectional view of a further embodiment of the invention incorporating a splined portion on the exterior portion of the adjustment wheel for receiving an outer ring having a stop member formed thereon; and,

FIG. 6 is an enlarged, partial cross-sectional view of the burner orifice of the burner valve showing the flow of gaseous fuel in solid arrows and the flow of atomized fuel in dashed arrows.

These figures and the following detailed description disclose a specific embodiment of the invention; however, the inventive concept disclosed herein is not limited thereto since the invention may be embodied in other equivalent forms.

Description of illustrative embodiment

Specifically, the burner valve of the present invention is incorporated into a gas fueled lighter construction having a reservoir **10** and the valve assembly is generally designated by numeral **11**. The valve assembly **11** includes a burner stem **12** having a central passage **14** extending therethrough along its longitudinal centerline. A flame height adjustment wheel **19** is rotatably mounted on burner stem **12**. Extending diametrically across the upper end of the burner stem **12** exteriorly of passage **14** is an anvil **15** having a substantially square cross-section. The lower end of the burner stem **12** which is opposite the end that supports anvil **15** is reduced in diameter to form an engaging portion **16** which is exteriorly threaded so that it may be received in an appropriate aperture A in the upper wall W of the reservoir **10**. Intermediate the ends of the burner stem **12** is an exteriorly threaded portion **18** which receives the adjustment wheel **19** thereon in threaded engagement.

Intermediate the threaded portion **18** and the upper end of the burner stem **12** is an annular recess **20** extending around the periphery of the stem **12** which is designed to receive an O-ring sealing means **21** therein.

The adjustment wheel **19** has a cavity **22** formed in its lower side to receive the upper end of the burner stem **12**. The lower inner portion of the central cavity **22** is threaded as at **24** to engage the threaded portion **18** of the burner stem **12**. The relative position of the adjustment wheel **19** with respect to the anvil **15** may be easily regulated simply

by turning the adjustment wheel in a selected rotational direction. The O-ring sealing means **21** fitted within the annular recess **20** engages the inner wall of the cavity **22** so that a leakproof seal is formed between the upper end of the burner stem **12** and the adjustment wheel **19**.

A wick **32** extends between the terminal upper end **25** of the central cavity **22** and the upper surface **34** of the anvil, and its ends hang over either side of the anvil **15** and through the passage **14** to terminate a substantial distance below the engaging portion **16** of the burner stem **12**. As is well known in the art, the wick **32** absorbs liquid fuel under pressure and transports this fuel to all parts of the wick **32** including that portion **35** extending between the terminal end **25** of the cavity **22** and the upper surface **34** of the anvil **15**.

On the upper exterior surface of the adjustment wheel **19** is an integral raised boss **26** having a gas escape orifice **28** formed therein, and communicating with the cavity **22** through a restricted evaporation orifice **29** which has a diameter substantially smaller than the gas escape orifice **28**. Carried within the gas escape orifice **28** is an impingement block **30** which is press fitted therein so as to be stationary. The impingement block **30**, is shaped so as not to block the flow of completely vaporized fuel through the gas escape orifice **28**. In the embodiment that is shown, the impingement block **30** is of triangular cross-sectional shape but it is understood that other cross-sectional shaped impingement blocks **30** may be selected.

The restricted evaporation orifice **29** is of such diameter that the atomized spray emitting from the wick **32** is directed toward and impinges upon the btotom surface **31** of the impingement block **30**. Therefore, any droplets of liquid fuel in the atomized spray are thus diffused and contained in the vaporization zone V of the burner orifice **28** defined between the bottom surface **31** of the impingement block **30** and the restricted evaporation orifice **29** sufficiently long to accomplish complete evaporation. The atomized spray of fuel moving through the restrictive evaporation orifice **29** is sufficiently forceful to accomplish complete vaporization prior to movement past the sides of the impingement block **30** where it leaves the gas escape orifice in gaseous form. This is best shown in FIG. 6 wherein the solid arrows designate the flow of completely vaporized fuel out of the gas escape orifice **28** and the dashed arrows designate the flow of the atomized fuel spray against the bottom surface **31** of the block **30**.

The amount of vaporized fuel supplied to the restricted evaporation orifice **29** is regulated by selected turning of the adjustment wheel **19** with respect to the burner stem **12** so that the portion **35** of the wick **32** extending between the terminal end **25** of the cavity **22** and the upper surface **34** of the anvil **15** is selectively compressed thereby regulating the compression of fibrous materials of the wick **32** so that the desired flow of fuel therethrough is achieved. As is shown in FIG. 5, the flame height adjustment wheel **19** may be of two piece construction having an inner portion **19***a* and an outer wheel or ring **19***b*, the inner portion **19***a* being splined as at S to receive complementary grooves of the wheel or ring **19***b* so that the outer wheel **19***b* engages the inner portion **19***a* for joint rotary movement.

A stop **40** extends from one peripheral edge of the wheel **19***b* so that its movement with respect to a complementary stop **41** (shown in dotted line) attached to the upper wall W may be limited. In this way, the desired mean flame height setting for the inner portion **19***a* may be first established and then the wheel **19***b* positioned to move the stop **40** with respect to the stop **41** to achieve maximum and minimum limits.

The flow of gaseous fuel from the gas escape orifice **28** is selectively sealed by gasket G carried in the manually operable cap C that is exteriorly positioned to overlie the boss **26**.

It will be obvious to those skilled in the art that many variations may be made for the purpose of illustrating the invention without departing from the scope thereof as defined by the appended claims.

What is claimed as invention is:

1. In a gas fueled lighter having a reservoir containing a supply of liquified gaseous fuel, a burner valve assembly including a flame height adjustment wheel having a gas escape orifice and a restricted evaporation orifice communicating with said gas escape orifice, supply means for supplying liquified fuel in said reservoir to said restricted evaporation orifice, a manually operable, exteriorly positioned closure member normally sealing the exterior extremity of said gas escape orifice, and impingement means positioned within said gas escape orifice and above said gas evaporation orifice so that when said externally positioned valve closure member is opened, the fuel that is emitted from said supply means is directed upwardly against said impingement means to diffuse any droplets of liquid fuel thus accomplishing complete evaporation of the fuel prior to emission from the exterior extremity of said gas escape orifice.

2. In a gas fueled lighter having a reservoir containing a supply of liquified gaseous fuel, a burner valve assembly comprising wick supporting means having a central aperture therein, a wicking means disposed over the upper surface of said wick supporting means and having a terminal end extending through said central aperture into communication with the fuel contained in said reservoir, a flame height adjustment wheel rotatably mounted on said supporting means and having a cavity formed in its underside to receive the upper end of said supporting means therein so that the portion of the wicking means disposed on the upper surface of said wick supporting means is held in compressed relation therebetween, said adjustment wheel including a boss formed on its upper surface with a gas escape orifice formed therein that communicates with a gas evaporation orifice of reduced diameter which in turn communicates with said compressed wick portion in said cavity, a manually operable, exteriorly positioned closure member normally sealing the exterior extremity of said raised boss, an impingement block positioned within said gas escape orifice and above the gas evaporation orifice so that when said externally positioned valve closure member is opened, the fuel that is emitted from the compressed wick portion is directed upwardly against said impingement block to diffuse any droplets of liquid fuel thus accomplishing complete evaporation of fuel prior to emission from the exterior extremity of said burner valve.

3. The apparatus of claim **2** wherein said impingement block is stationarily located in said gas escape orifice.

4. The apparatus of claim **2** wherein the cross-sectional area of said impingement block is less than the cross-sectional area of said gas escape orifice.

5. The apparatus of claim **2** wherein said impingement block has a triangular cross-sectional shape.

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