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GAS LIGHTER CONTROL UNIT

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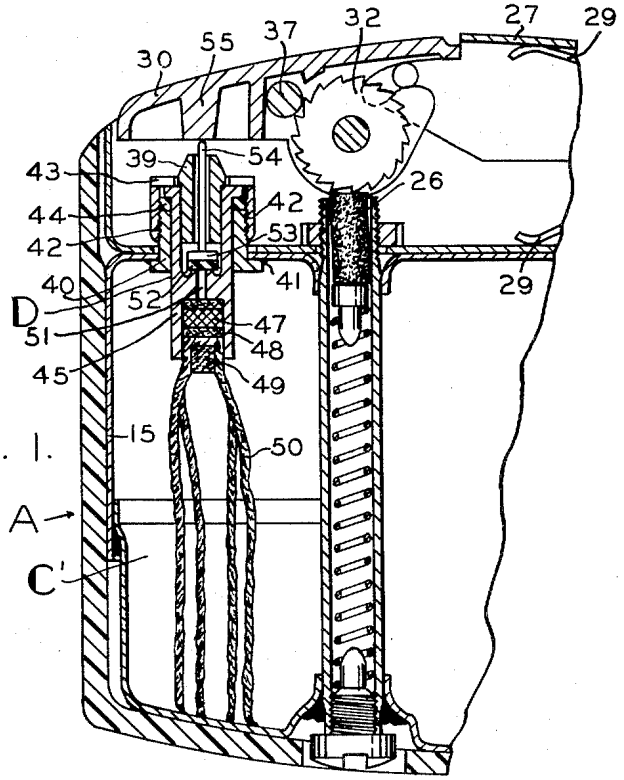

FIG. 1.

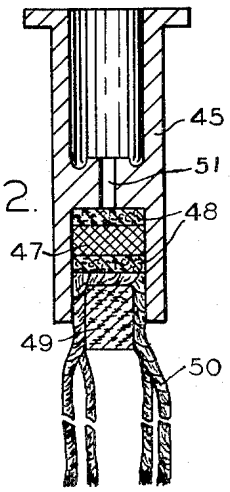

FIG. 2.

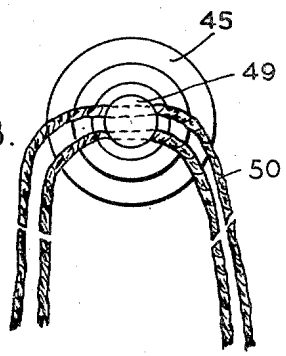

FIG. 3.

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GAS LIGHTER CONTROL UNIT

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3 Claims. (Cl. 67—7.1)

This invention relates to a removable reducing valve and shut-off valve unit for wickless lighters which employ compressed liquid fuel and wherein a pressure retarding valve is required to permit the gas to escape from the cartridge or chamber of the lighter, which holds the supply of compressed liquid fuel.

A feature resides in providing a retarding valve for a gas lighter wherein no wick is used and where the flow of gas from the supply cartridge or chamber must be regulated to give a predetermined flame or to regulate the size of the flame by the reducing valve so as to provide virtually a constant size flame when the shut-off valve of the lighter is opened and the gas is ignited.

A further feature of the lighter resides in the form of a reducing valve which is employed to retard the flow of gas from the gas cartridge. This valve includes a porous pellet made of zinc oxide powder which is compressed under a predetermined pressure to provide the desired size and density to the pellet. Heavy filter discs are positioned on either side of the pellet in operative position and a cord-like member is held in contact with the lower filter disc to provide a means of keeping the filter discs and pellet moist with the liquid fuel from the cartridge or fuel chamber with a wet pellet at all times, the liquefied fuel gasifies at the nozzle, when the valve is open, at a faster rate than if the gas passed through and issued from a dry pellet in travelling from the inside of the gas chamber to the outer atmosphere. If there is any appreciable lag between the production of the spark of the lighter and the issuance of a sufficient supply of gas from the nozzle in a regulated amount, the lighter, of course, will not work. With the construction herein set forth, the issuance of gas from the nozzle of the lighter is at a faster rate than heretofore accomplished, thus doing away with any appreciable lag which prevents ignition of the gas by the pyrophoric spark means of the lighter. With the gas issuing from the nozzle at a rapid rate, a flame will be kindled even though the spark produced is a weak one. The cord member may be held in contact with the lower filter disc by a cork or any other suitable means.

The pressure reducing valve unit is held in a sleeve in a position to be removed by loosening the nut which holds the reducing valve unit in the sleeve.

A shut-off valve is also supported in the sleeve of the reducing valve unit and is formed with a valve head which carries a rubber gasket closure member which is adapted to close the small axial passageway leading from the pressure reducing valve. The shut-off valve is provided with a valve stem which extends from the head up through a sleeve which forms the nozzle of the lighter and all of which parts are held in the removable sleeve with the pressure reducing valve to provide a unit which may be removed, whenever desired, from the fuel cartridge. The fuel cartridge has a fixed sleeve which supports the reducing valve and shut-off valve unit.

The invention includes the method of forming a pressure reducing valve for lighters which use a liquid compressed fuel such as iso-butane and which must be emitted from the lighter through a hollow nozzle or passageway in the form of a gas so that the liquid fuel will not squirt out of the lighter and so that a controlled flame is provided. This is accomplished by the method of forming a pellet valve body from zinc oxide powder (dry process). The powder is compressed into a small pellet of a predetermined density, which controls the height of the flame by the gas which is emitted from one side of the pellet. The other side of the pellet normally is moist with the liquid fuel. The method further includes forming a valve body of zinc oxide powder or similar material to the desired density and placing the pellet between two filter discs, which may be of paper or other suitable material, and providing a cord-like member having an absorbent nature so as to carry the liquid fuel by capillary attraction to the filter discs and pellet.

In carrying out my method, the valve formed as described above has the property of permitting the liquid fuel to boil off in the form of a gas from the pellet valve and passing out to the outer atmosphere where the gas is ignited as it mixes with the outer atmosphere by means of a pyrophoric element such as is used for lighters of this character.

The various features and details of the removable reducing valve and shut-off valve unit will be clearly and fully defined throughout the specification and claims.

Figure 1 is a section through a portion of a lighter in side elevation wherein the removable reducing valve unit is employed.

Figure 2 is a vertical cross section through the reducing valve unit and showing the same removed from the fuel chamber of the lighter.

Figure 3 is a bottom view of Figure 2.

The lighter A, as illustrated in part, shows the position of the removable reducing valve unit D in relation to the fuel chamber C'. The complete lighter A is illustrated in a co-pending case which is being filed at the same time as this application.

The lighter A employs a pyrophoric flint **26** which is operated by the flint wheel **32** to throw a spark over the open end of the nozzle **39** when the operating lever **27** of the lighter A is depressed.

The operation of the lever **27** causes the roll or ball clutch **37** to engage against the teeth of the flint wheel and rotate the wheel to abrade the flint **26**.

The nozzle **39** of the unit D is normally covered by the hood **30** when the lighter is not in use. When the lever **27** is depressed, the hood **30** is elevated which in turn operates the clutch **37** to operate the flint wheel **32**.

The unit D includes the removable reducing valve supported in the lower end of the sleeve **45** and which consists of a porous pellet **47** made up of zinc oxide powder which is compressed to a predetermined pressure to form the pellet **47** in the desired size and with the desired density so as to act in controlling the flow of gas through the pellet. On either side of the pellet **47** I provide heavy filter discs **48**, which provide a further retarding means in operation with the pellet **47**.

At the lower end of the sleeve **45** a cord-like member **50** is held by the cork **49**. The cord member **50** hangs in the chamber C' of the lighter A and is immersed in the liquid compressed fuel therein contained and acts to carry the liquid to the disc **48** and the pellet **47** to keep the same moist with liquid fuel when the shut-off valve is closed and to permit evaporation of the liquid fuel off of the top filter disc and permit the fuel in gas form to pass out through the small axial opening **51** in the sleeve **45** when the shut-off valve is opened.

The shut-off valve **53** carries a rubber gasket **52** which normally closes the opening **51** when the stem **54** of the valve bears against the projection **55** in the hood **30** when the hood is closed (as illustrated in Figure 1).

When the hood **30** is lifted by depressing the lever **27**, the pressure of the gas in the chamber C' will lift the valve **53** owing to the raising of the hood **30**. This permits the gas to escape through the pellet **47** and the reducing valve filters **48** and past the cord member **50** out through the axial passage **51** around the shut-off valve **53**, past the stem **54** and out the nozzle **39**. When the hood **30** is in closed position, the tension of the spring **29** on the lever **27** is transmitted through the hood **30** to the stem **54** so that the stem **54** is in reality under spring tension to hold the valve **53** closed when the hood **30** is closed. Simultaneously with the lifting of the hood **30** and the escaping of the gas out of the nozzle **39**, the pyrophoric flight **26** will throw a spark over the nozzle **39** and ignite the escaping gas. Thus a flame of predetermined height will burn from the nozzle **39** as long as the lever **27** is depressed and the hood **30** is elevated. The moment the hood **30** is lowered, it will strike the stem **54** and close the passageway **51** shutting off the gas fuel from escaping out of the nozzle **39**.

The unit valve D is of primary importance because it provides a pressure reducing valve which is combined with a shut-off valve in the sleeve **45** and the unit is easily removable for replacement or repair by loosening the nut **43**, which normally holds the sleeve **45** in operative position and seals the same against leakage around the sleeve by the ring gasket **44**. The operation of the pressure reducing means in unit D to prevent liquid fuel from squirting out through the opening **51** and around the valve stem **54** is unique in that it provides a pressure reducing means which controls the flow of gas out of the nozzle **39**. This is accomplished by maintaining the elements of the reducing valve, namely the pellet **47** and the heavy filter discs **48**, moist with liquid fuel as long as the cartridge C' contains any liquid fuel. The liquid fuel is carried by the cord member **50** to the lower disc **48** and by capillary attraction the pellet **47** is moistened, and even the top filter disc **48** becomes moist as long as the valve **53** is closed.

When the valve **53** opens, the liquid fuel collected on the elements **47** and **48** tends to evaporate through the opening **53** and out of the nozzle **39** whereupon the cord member **50** feeds more liquid fuel to the porous pellet **47**, and as the same passes through the pellet and the filter discs **48**, the liquid fuel is reduced to a gas which is ignited by the pyrophoric element **26**. In this manner the pressure reducing process takes place permitting the liquid fuel to turn into gas as it escapes through the small opening **51**.

The density of the pellet member **47** acts to control the flow of gas from the chamber C', and the filter discs **48** also assist in retarding the flow of gas from the storage chamber and prevent the liquid fuel from passing out through the nozzle **39**. Further, the cord acts to keep the members **47** and **48** moist with liquid fuel so that the amount the valve **53** is opened, gas starts to escape out of the nozzle **39** where it mixes with the outer atmosphere and is easily combustible into a flame when the pyrophoric element throws the sparks into the flow of gas. Also by this means I am able to control and regulate the height of the flame, which is very important in a lighter of this character. In fact, I am able to secure a constant flame by means of the pressure reducing elements in the unit D, as heretofore set forth. It is also an advantage to provide a whole unit D which is readily removalble, and in this manner the lighter A may be quickly assembled or repaired when it is necessary.

The method of forming the pellet **47** is important in the successful operation of the lighter A, and while I have stated that the pellet is formed of zinc oxide powder (dry process) analytical reagent, compressed under a controlled pressure to provide the proper density to the body of the pellet, it is apparent that other material may be used and the degree of compression may be varied in the forming of the body of the pellet, which acts as the valve body for the valve assembly D. The method includes the positioning of the pellet **47** between the filter discs **48**, which may be of any suitable material, and providing the liquid absorbing cord **50** held by the retainer **49** so that it contacts the lower disc **48**. This provides a means of keeping the members of the reducing valve moist as long as there is liquid fuel in the lighter.

In operation, when the lighter A is opened by pressure on the lever **27**, the shut-off valve **53** is opened and the moment the wet pressure reducing valve, consisting of the pellet **47** and the discs **48** is opened to the outer atmosphere through the small passageway **51**, the liquid fuel will boil off of these members **47** and **48** and will pass out through the nozzle of the lighter in the form of a gas. However, the liquid fuel will not be permitted to squirt out of the nozzle, which might give a dangerous flame if this took place in the lighter A. Therefore, the method of forming the pressure reducing valve and positioning it in the sleeve or thimble-like holder is important. As the liquid fuel is evaporated or boiled off or one side of the reducing valve members **47** and **48**, the cord **50** will feed a sufficient amount of liquid fuel to these members, and the liquid fuel will evaporate therefrom in a controlled manner, which is accomplished by my method of forming the pressure reducing valve unit D, and in this manner I have accomplished a very desirable means of providing the proper size and controlled flame.

The sleeve **40** is welded at **41** to the upper ring portion **15**. The threaded nut **43** engages with the threads of the sleeve **40** and draws the top rim of the sleeve **45** down upon the gasket **44** against the upper edge of the sleeve **40**. A seal is thus maintained between the valve unit and the ring portion **15**, and because of this construction the valve D may be easily inserted and removed.

I claim:

1. A removable reducing and shut-off valve unit for a gas lighter adapted to use a compressed liquid fuel wherein no wick is used for the flame, including a sleeve, pressure reducing means positioned in the lower end of said sleeve and comprising a porous pellet formed of a metal oxide powder said pellet interposed between paper filter discs, a moistening cord secured in the lower end of said sleeve and contacting said lower filter discs to carry the liquid fuel to said pressure reducing elements and keep the same normally moist with liquid fuel, an axial gas passageway leading from said reducing elements, a shut-off valve having a soft sealing gasket for normally closing said gas opening, a nozzle secured in said sleeve, a valve stem projecting from said shut-off valve and extending through said nozzle out of which gas escapes when said valve is open and when pressure is relieved from the outer end of said valve stem.

2. A removable reducing valve and shut-off valve unit adapted to be used to control the flow of gas from the reservoir of a lighter wherein liquid fuel is stored, including a removable sleeve support, a nut for holding said sleeve in operative position, a hollow nozzle positioned in the upper end of said sleeve, a shut-off valve having a valve stem extending through said nozzle and projecting therefrom and adapted to be contacted by the hood of the lighter to normally hold said valve closed, a small gas passageway below said valve, and pressure reducing elements positioned in the lower end of said removable sleeve including a porous metallic pellet, filter discs, and a liquid conducting member held in contact with the lower of said discs and adapted to extend into the liquid gas chamber of the lighter to cause said pressure reducing elements to be moistened by liquid fuel.

3. The combination with a wickless lighter which is adapted to use a compressed liquid fuel and having a pyrophoric lighter means and hood to close the lighter, a shut-off valve having a valve stem adapted to be engaged to hold said shut-off valve closed under spring tension by contact with said hood, a pressure reducing means positioned below said shut-off valve, a passageway connecting said

pressure reducing means with said shut-off valve to permit gas to escape therethrough from said pressure reducing means when said shut-off valve is opened, said pressure reducing means comprising filter disc means, porous pellet means mounted between said filter disc means and a feeder cord in contact with said disc means for feeding liquid fuel to said pressure reducing means.

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