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PELLET VALVE AND METHOD OF MAKING THE SAME

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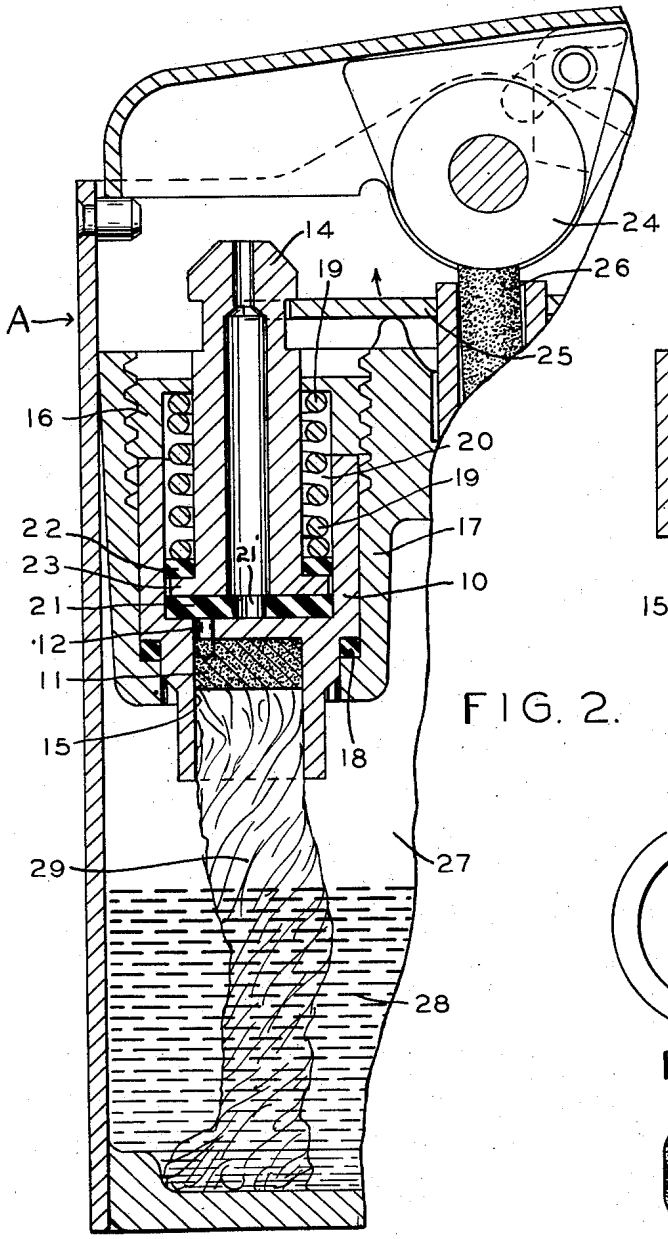

FIG. 2.

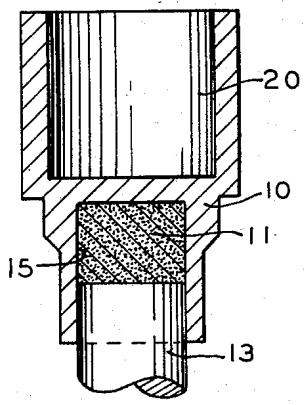

FIG. 1.

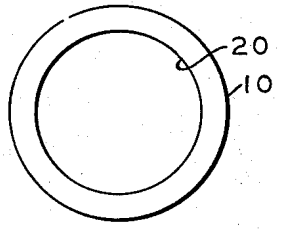

FIG. 3.

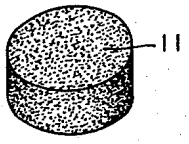

FIG. 4.

Inventor
PAUL W. FELT

By

Howard P. Richter

Attorney

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PELLET VALVE AND METHOD OF MAKING THE SAME

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

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1 Claim. (Cl. 29—157)

This invention is for a pellet valve and method of making the same for gas lighters which use iso-butane gas or similar fuel instead of gasoline. The pellet valve is designed to control the flow of gas from the fuel compartment out of the nozzle of the lighter. The gas is ignited by a pyrophoric flint and burns from the top of the nozzle until the valve is automatically closed when the operating lever is released.

The method is carried out by providing a thimble supporting member for a pellet of powdered or granular inert material, which may consist of asbestos, fuller's earth, unsintered powdered material, ceramic materials, powdered glass, fine metallic granular particles or any other suitable material, which is adapted to be first compressed to a predetermined density. This first step leaves the body of the pellet sufficiently porous to permit the iso-butane or similar material to pass through the pellet and escape therefrom in the form of gas, which when released from a nozzle may be ignited by a pyrophoric element. The next step of the method resides in forming a hole through the inner wall of the thimble and simultaneously piercing or drilling into the body of the compressed pellet. This provides a gas escapement hole through the wall of the thimble and the pellet.

In carrying out my method, I found that by compressing the materials which make up the pellet to a predetermined density I am able to regulate the height of the flame at the nozzle of the lighter.

The method may also be carried out by compressing the material to be used for the pellet valve in any suitable manner, with the first step the compressing of the material to a predetermined density, and the next step of the method is carried out by placing the pellet in a suitable container for supporting the same and providing a gas escapement hole from the container adjacent the pellet in a manner to cause the gas from the compressed fuel in the lighter to be passed through the pellet so that it will not be discharged through the nozzle in liquid form but will be in a gaseous state and when mixed with the outer atmosphere may be readily ignited by a pyrophoric flint or other suitable lighting means provided for the lighter, which may be in the form of an electric heating element (not shown in the drawings) or any other suitable means of igniting the escaping gas from the reservoir of the lighter.

A further feature of my invention resides in providing a porous pellet valve of any suitable shape, size and design through which the fuel from the reservoir may escape in the form of a gas and which may be kept moist or wet by means of an internal wick, to provide a means of maintaining the pellet valve moist from the liquid in the reservoir of the lighter, and thereby maintaining a uniform rate of flow of gas through the porous pellet valve. This internal wick is held in contact with the pellet valve in any suitable manner, and the wick extends into the body of the fuel compartment of the lighter so that through capillary attraction the wick keeps the pellet valve

moist so long as there is any liquid fuel in the reservoir of the lighter.

I have also found that my pellet valve will operate without the wick, and the lighter may be operated with a good flame. However, the flow of gas through the pellet valve seemed to be more uniform where the wick is employed to keep the pellet valve moist with the liquid fuel.

A feature of my pellet valve resides in providing a lighter wherein iso-butane or a similar liquid fuel may be carried in the fuel reservoir of the lighter without requiring the chamber of the reservoir to be filled with absorbent cotton or other fuel absorbing material. Heretofore lighters of this character have required the packing of the fuel chamber with an absorbent material or cotton and also required minutely adjusted valves of various types so as to control the escaping butane from the fuel chamber and to prevent its spurting out of the nozzle of the lighter in the form of a liquid under different atmospheric temperatures. In these other forms of valves and lighters where the reservoir chamber is packed with cotton, the height of the flame of the lighter was difficult to control. I have overcome these features by my simple form of valve, which is made up of a porous material and which may be formed by my method of powdered metallic or non-metallic material. Where metallic materials are used, the compressed pellet valve may be sintered or not. Further, an internal wick may be used, or the wick may be omitted.

When a lighter uses a fuel such as iso-butane or other liquid compressed fuel, a hollow flame nozzle without a wick is used, and it is important that only gas from the fuel escape through this flame nozzle. It is very important that the fuel from the chamber does not escape in the form of liquid. Where iso-butane or a similar liquid fuel is introduced into the reservoir chamber of the lighter to provide the supply of fuel therefor, by using my pellet valve the liquid fuel is permitted to escape through the pellet valve in such a manner that the liquid fuel expands into the form of a gas before it is released to the outer atmosphere, and thus I overcome the danger of liquid fuel spurting out of the nozzle of the lighter.

A primary advantage of using a gas lighter of the character set forth is in obtaining as many lights as possible from a single filling of the fuel chamber, and therefore it is important that a large volume of liquid fuel be stored in the fuel chamber of the lighter. My pellet valve overcomes the necessity of using absorbent cotton or other filler material in the fuel chamber, and thus I am able to store a larger volume of liquid fuel therein, and with a larger volume of fuel more lights are obtained from one filling of the fuel chamber.

In the old form of valves for gas lighters of this character, minute valve openings were necessary even though the fuel chamber of the lighter was virtually filled with absorbent cotton. These old forms of valves with small openings therethrough have a tendency to plug up either with the impurities carried to the valve by the liquid fuel or by the liquid fuel becoming lodged in the small openings of the valve and thereby sealing off the flow of gas to the flame nozzle. My pellet valve overcomes these difficulties owing to the fact that by my method the valve is scientifically constructed to have the correct density and porosity to prevent liquid fuel from reaching the flame nozzle or spurting out of the same. Furthermore, my pellet valve gives off gas on the outlet side thereof, and the gas will not carry any impurities in the porous openings in the valve.

In the operation of my pellet valve, it is preferred to keep the body of the valve wet with the liquid fuel, and when the valve to the flame nozzle, which is positioned directly adjacent the outlet side of the pellet valve, is

closed, the entire body of my pellet valve remains wet with liquid fuel. However, when the flame nozzle valve is opened to permit gas to escape to the outer atmosphere from the fuel chamber of the lighter, the iso-butane liquid fuel begins to boil on the outlet side and gives off the fuel gas of the lighter, which escapes out of the flame nozzle and is ignited by the pyrophoric element, where the flame continues to burn as long as the nozzle valve is open. The depth of the hole made in the outlet side of the pellet valve is very important so as to provide the correct area of the pellet valve out of which the gas is dispensed when the wet liquid fuel begins to boil in the pellet valve.

Therefore, it will be apparent that it is of primary importance that the pellet valve be made correctly to give a predetermined density and porosity to the body thereof and that the outlet opening from the body of the pellet valve be of the correct depth or size to give the proper area out of which the gas flows instantly with the boiling of the liquid fuel coming from the fuel chamber and passing into the body of the pellet valve.

In the drawings forming part of this specification:

Figure 1 is an enlarged cross section of a thimble valve support illustrating the first step of my method.

Figure 2 is an enlarged cross section of a portion of the lighter using a pyrophoric element for igniting the escaping gas from the nozzle of the lighter, and showing the next step of my method where the body of the pellet valve has been compressed to a predetermined state, and also illustrating the third step of the method where a small hole has been formed in the thimble which supports the pellet valve and showing a recess formed in the body of the valve itself.

Figure 3 is a plan view of Figure 1, showing the circular formation of the thimble which supports the pellet valve.

Figure 4 illustrates the pellet valve in partially compressed form before it has been introduced into the compressing and supporting thimble and before an opening has been drilled into the body of the same.

A feature resides in providing a lighter for cigarettes, cigars and a pipe or for a similar use where a flame is desired, and wherein no outer wick is used, which ordinarily is covered by the cap to prevent evaporation of the fuel from the wick like that used in old types of lighters.

My lighter does not use an outer wick but has a hollow nozzle valve through which gas from the reservoir chamber of the lighter is adapted to escape so that it can be combined with the outer atmosphere and be ignited by a pyrophoric flint or any other suitable lighting means (not illustrated in the drawings).

It is extremely important in a lighter of this character that the fuel which ordinarily is introduced into the reservoir chamber of the lighter in a liquid form and which may be iso-butane, propane or any other suitable liquid fuel, which when released into the outer atmosphere will expand into a gas and then be ignited into a flame.

Heretofore the difficulty has been to control the escaping of the fuel from the chamber so as to be sure that this fuel will be in the form of a gas and not be in liquid form. This I have accomplished by my method in the forming of a pellet valve, which may be metallic or non-metallic and which material may be of any suitable nature such as powdered or granular material, inert material such as asbestos, fuller's earth, sintered and unsintered powdered material, ceramic material, powdered glass and any other material which may be compressed from powdered form into a body of porous material, in which the liquid fuel may expand into the form of a gas and thus be discharged from the pellet valve out of a hollow gas nozzle in gas form (not in a liquid).

My method consists in placing a partially formed or compressed granular material such as heretofore stated into a thimble **10** or placing the powdered granules into the thimble **10**, then compressing the powdered granular material **11** to a predetermined density (as illustrated in Figure 2), then drilling or forming a hole **12** in the bottom of said thimble and either simultaneously extending the hole **12** into the body of the pellet valve or forming the same therein, if desired, to provide an escapement passageway for gas from the body of the pellet valve through the wall of the thimble. In carrying out my method above set forth, a plunger **13** may be employed to compress the pellet **11** to the proper density. When the pellet **11** is compressed, it reduces the size of the same, and the degree of compression thereof is to a predetermined amount so as to secure the proper density of the pellet. The density of the pellet **11** controls the height of the flame out of the hollow nozzle **14**.

The pellet valve **11** may be partially compressed, as illustrated in Figure 4, and may then be dropped into the recess **15** of the thimble **10**, after which the next step resides in forcing the plunger **13** under pressure against the body of the pellet **11** to compress the same into approximately the size illustrated in Figure 2, and after the pellet **11** has been compressed in the thimble **10**, the wall of the thimble is drilled with a hole **12**.

The thimble **10** is held by the threaded nut **16** in the body portion **17** of the lighter A, as illustrated in Figure 2. A gasket **18** seals the thimble **10** in place in the body portion **17** of the lighter. The flame nozzle **14** is also held by the nut **16** and the coil spring **19** in operative position in the top recess **20** of the thimble **10**.

A sealing gasket **21** is positioned below the flame nozzle **14** to normally close the passageway **12** from the pellet valve **11**, and a further sealing washer **22** is provided beneath the spring **19** and adjacent the flange **23**, which is formed on the bottom of the flame nozzle **14**. These gaskets keep the gas from leaking when the nozzle is closed by the spring **19**, and the washer **22** prevents escaping of gas around the nozzle when the nozzle **14** is open. The nozzle **14** is adapted to be opened simultaneously with the operation of the flint wheel **24** by the lever **25**, so that when the lever **25** raises open the nozzle **14**, the flint wheel **24** will throw a spark from the pyrophoric member **26** over the top of the nozzle **14** and thus ignite the escaping gas coming from the reservoir **27** of the lighter A.

The iso-butane is carried in its liquid form **28** in the reservoir chamber **27** and is adapted to expand into gas form through the pellet valve **11**, which is sufficiently porous to permit the gradual expansion of the liquid iso-butane **28** into gas before it escapes out of the opening **12** and through the hollow nozzle valve **14**. The sealing washer **21** has a central opening **21'**, which permits the gas to escape from the opening **12** up through the hollow nozzle **14**, where it is ignited into a flame when it comes into contact with the outer atmosphere by the pyrophoric flint **26**.

While my lighter A will operate satisfactorily with my pellet valve **11**, when the same is formed by my method without an internal filter wick **29**, I have found by using the internal filter wick **29** the liquid **28** may be carried by capillary attraction to the pellet valve **11** keeping the same moist, and thereby providing a uniform condition in the valve **11** so that the flow of gas through and from the valve **11** is uniform, and thereby I maintain a uniform height flame from the nozzle **14**. The wick **29** also acts to carry the liquid butane **28** or any other similar liquid fuel to the porous pellet valve **11**, when the supply diminishes in the reservoir **27**, thereby maintaining a uniform condition in the lighter A, which is desirable.

My pellet valve provides a controlled retarder, which prevents liquid fuel from spurting out of the opening **12** through the opening **21'** and the hollow flame nozzle **14**, thereby protecting the operator against any unusually high flame from the lighter A. Further, the degree of

density of my pellet valve **11** is extremely important, and it is desirable to use the most effective material for the pellet valve, which under all circumstances will properly regulate the flow and expansion of gas from the flame nozzle **14**.

The liquid fuel is brought into contact with the pellet valve by the wick which keeps the pellet moist, and when the valve washer **21** is opened by raising the flame nozzle **14**, evaporation of the liquid fuel takes place in the pellet valve **11**, and the vapor gas passes out through the flame nozzle **14** and is ignited.

It is important that the pellet valve **11** be properly compressed to a predetermined density, and the area of the same is essential to control the evaporation of the liquid gas from the lighter A to give a predetermined flame under the varying conditions, and this I have accomplished by my method of forming the pellet valve and also by piercing the surface of the same by the hole **12**, which penetrates through the skin of the pellet valve and exposes the unglazed portion of the same, which permits the flow of gas through the pellet in a more effective manner.

The filter wick **29** acts to filter any impurities in the liquid isobutane **28** in the chamber **27** from reaching or clogging the pellet **11**.

I claim:

The method of forming a pellet valve for cigarette lighters using a liquid fuel, which has a rapid evaporation upon being released to the atmosphere, consisting in compressing a powdered material in a container to a predetermined density and with a porosity capable of permitting the liquid fuel to evaporate through the pellet valve in the form of gas, then piercing the container supporting the pellet valve and simultaneously piercing the body of the pellet, thereby providing a porous pellet valve in which evaporation of liquid fuel may take place so as to give off a gas vapor capable of being burned when mixed with the outer atmosphere.

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