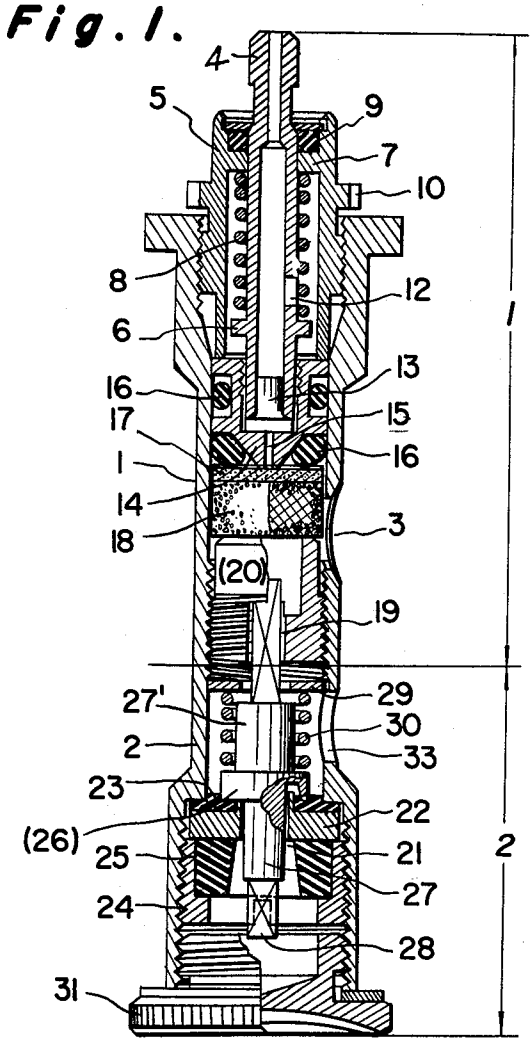
May 25, 1965 ZENZABURO YOSHINO 3,184,931

GAS LIGHTER AND METHOD OF CARBURETION OF LIQUEFIED FUEL

Filed June 18, 1963 2 Sheets-Sheet 1

Fig. 1.



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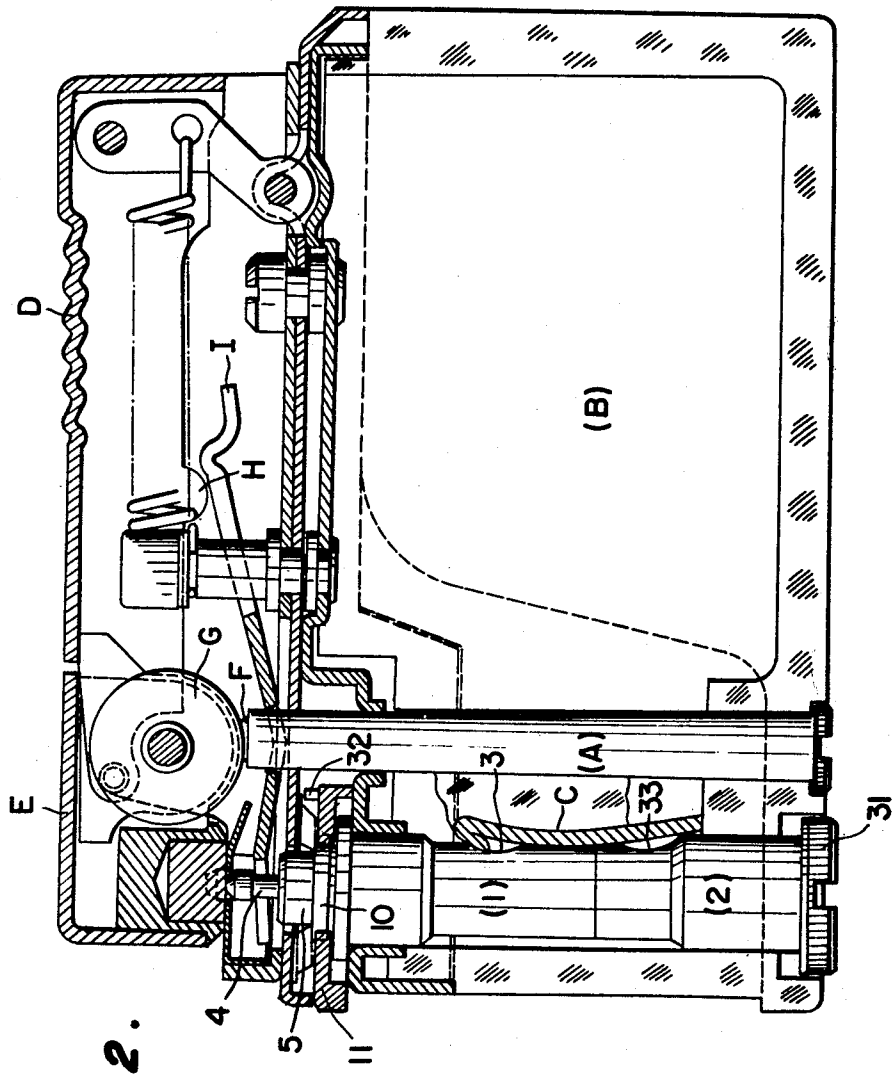


Fig. 2.

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GAS LIGHTER AND METHOD OF CARBURETION OF LIQUEFIED FUEL

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1 Claim. (Cl. 67—7.1)

This invention relates to a gas lighter and method of carburetion of liquefield fuel. The two most important parts of a gas lighter, especially of small size portable lighters, using high pressure liquefield fuel which is easily carburetted under chamber temperature, as the part to supply fuel and the output part to take out fuel. Regulation of the amount of fuel flowing out at the output should be free and easy. Moreover the manufacture of such should be economical. At present, however, there is no such construction and equipment as to fulfill these requirements.

This invention has as its object the provision of a gas lighter which is improved in that its assembling during manufacture is easy and simple, and also the regulation of its flame length is smooth and accurate. In the output of liquefied fuel a layer of compact textile material providing an impregnant band is so contacted overlapping a porous metal block, that the fuel may be held impregnated in the air-tight chamber, and then the fuel may be carburetted in necessary amounts, by compressing the said fuel impregnant band. In other words, the fuel may be contracted out by necessary amount and then carburetted and flown out through a port. The amount of contraction has a lineal relation with the density of the impregnant band.

The fuel may be contracted out in the desired amounts and then carburetted to be forced out through a port. The amount of fuel contracted out bears a lineal relationship with the density of the fuel in the impregnated band.

A push piece is provided in contact with the impregnated band which regulates the density of the fuel impregnated band determining the amount of fuel which can be blown out.

On the input side or supply side of the high pressure liquefied fuel a valve is provided which is compressed upon a valve bush. A valve rod is driven by the opening of a fuel tank associated with the rotation of the push piece.

The drawing shows an example of a pocket lighter in which this invention is performed. FIGURE 1 shows the vertical section of the regulating device in both input and output and FIGURE 2 shows the vertical section of the whole lighter. As the upper half 1 of the cylinder contains the output and the lower half 2 contains the input, there is no necessity to show a connection between them although in FIG. 1 they are shown together in one body. If necessary the two cylinders may be separated.

At the lower outside of the upper half cylinder 1 a fuel entrance 3 or side port is formed and in its upper portion a regulator cylinder 5 is screwed rotatably within its bore. A flame nozzle 4 is held vertically and movably within the bore of cylinder 5, the said flame nozzle having a lower flange 6 intermediate thereof. An inner flange 7 is provided upon the upper part of the said cylinder 5, and a helical spring 8 is disposed between the said inner flange 7 and the said flange 6 around the said cylinder 5. The said spring always compressing the said flame nozzle 4 downwards. At the upper part of the said inner flange 7 an elastic protecting ring 9 is provided to have the flame nozzle 4 air-tight. At the upper outside of the regulator cylinder 5 an operator ring 10 is provided which is associated with another hand-driven ring plate 11

(see FIG. 2). At the intermediate part of the said flame nozzle 4, a gas entrance 12 is formed and at its lower end the flame nozzle is compressed upon the center opening of a throttle valve 14 through the non-return valve 13. The said valve is inserted into the upper half of cylinder 1 through the air tight protecting bush 16 slightly movable in it, the lower parts of the said valve being formed as a cone shaped nozzle and compressing upon the fuel impregnant band 17, the lower surface of the band overlapping a porous metal block 18 which communicates with the said fuel entrance 3. In the lower surface of the said metal block 18 a push piece 20 is compressed which is screwed at the lower part of the upper half cylinder 1 and which has a key groove or spline groove in its lower center. The impregnant band used here is of a type which is porous and made of compact textile layer as for example filter paper blocking layer, felt, unwoven sheet, and the porous metal block 18 is those which must be sintered of fine bead particles of a certain diameter as brass and copper and must have sponge-like fine air holes in them.

At the upper portion of the lower half cylinder 2 a fuel conducting hole or port 33 is formed and at the lower portion of the cylinder 2 a thread is cut. At the inside of the cylinder 2 a valve bush 22 is inserted, having a hole 21 in its center, the upper surface of the said bush being covered by an elastic bush 23, the lower surface of the said bush being cushioned by an elastic ring bush 25, which is compressed by a screw cylinder 24. Through the said center hole 21 a valve rod 27 is inserted, at the intermediate part of the said valve rod 27 a downward valve 26 is provided and the lower end of the said valve rod 26 becomes as a key 28. The upper end of the said valve 26 is formed as a key or as a spline, which is moved in the key groove or spline groove which is cut in the said push piece 20, and so the said push piece 20 is associated with the upper valve rod 27'. Between the upper surface of the said valve 26 and the stop ring 29 a helical spring 30 for compressing is disposed around the rod. At the lower end of the said lower half cylinder 2 a blind plug 31 is screwed.

The bush 23 forms with valve 26 a valve pair which is opened when spring 30 is compressed and which is normally closed under the force of spring 30.

It is only a technical convenience, as mentioned above, to construct one cylinder comprising the upper (1) and lower (2) half cylinder, or as shown in the drawing to construct it into one integral body.

Cylinders 1 and 2 are inserted and affixed into one side of the fuel tank of the lighter (FIG. 2), an ignition device A is mounted parallel along the said cylinder. A blocking plate C of porous metal is provided between the fuel tank and the entrance hole 3 of the cylinder 1.

The lighter is used in the usual way, that is to say, pushing the push cover D moves the flame hole cover E, at the same time rotating the file wheel G associated with the push cover D, this strikes the flint F and lets the spark radiate into the flame of the flame port 4. Then cam H provided at the lower edge of both sides of the push cover D kicks the lever I, which moves upwards. The flame port 4 held at the top fork of the lever comes to the ignition position, indicated with dotted lines in the drawing, and becomes ready for ignition.

Upon the ignition the flame port 4 is moved upwardly by the lever I, the spring 8 is compressed, the lower end of the spring is loosened and so also the space between the throttle valve 14 and the impregnant band 17 is loosened, the liquefied fuel impregnated in the said band is carburetted, carburetted gas moves through passage 15 and raises the non-return valve 13, it passes through the space between the regulator cylinder 5 and the flame

port 4, enters through the hole 12 into the flame port 4, flows out from the flame nozzle 4 on the upper end. The length of the flame can be varied by the regulation of the amount of the pressed liquified fuel flowing out, contracted through the contracting valve 14, by regulating the pressure between the contracting valve 14 and the impregnant band 17 by rotating the operator ring 10 associated with regulating ring 11. A stop pin 32 is provided for limiting the rotation of the regulating ring 11 driven by the operator ring to a certain limit.

The limitation of the flame length to a certain scope depends as shown upon the impregnated amount of liquefied fuel contained in the impregnant band and this impregnated amount also depends upon the density of the band. This is made by regulating the pressure upon the porous metal block 18 which can limit and let the fuel pass; this pressing is made by the back and forth movement of the push piece 20, therefore causing the rotation of the valve rod 27' and 28 associating with the push piece 20 and the key.

The valve rod 27' and 28 is affixed at the fuel supplying valve 26, but the rotation of only this valve rod has no influence upon the opening and closing of the said valve.

In order to supply the fuel, one must push the entrance of the fuel tank (bomb) into the ring bush 25 which then pushes the top of the non-return valve annexed to the tank and loosens it, moving the valve 26 upwards resisting against the spring force of the spring 30 by its own pressure, the fuel passes through the clearance of the valve and the entrance 33 at the lower half cylinder and the fuel is supplied into the fuel storing part or tank B of the lighter. Therefore if the bomb is detached as it were, the valve 26 is stopped by the spring 30. Thus it is both possible to have the upper half cylinder 1 in the output and the lower half cylinder 2 separated or associated with one another. All one has to do is to associate the key of the valve rod 27' of the lower half cylinder with the key groove of the push piece in the upper half cylinder.

What I claim is:

In a gas lighter a substantially cylindrical container, a fuel storage tank and first and second side ports formed in said container communicating the interior thereof with said fuel storage tank, said container including a porous metal block in communication with said first side port, an impregnant band in contact with said block disposed between said band and said first side port, a throttle valve within said cylinder and firmly embracing said band, a plunger, a passage formed in said throttle valve adjacent said band, a spring normally pressing said plunger downwardly toward said passage, normally closed valve means actuated by said plunger normally closing said passage, means whereby said plunger can be raised against the force of said spring to carburet fuel from said impregnant band and actuate said normally closed valve means to release said carbuetted fuel, a push member adjacent to and pressing on said porous block on the side thereof away from said throttle valve, the amount of fuel contained in said impregnant band being determined by the force with which said push member pushes on said porous block, said push member having a groove formed therein, a valve rod within said container adjacent said second port with a portion thereof movably disposed within said groove, an entrance port formed in said container, an annular valve member within said container between said entrance port and said second side port, a valve portion of said valve rod, a valve formed by said valve portion and said valve member, and spring means yieldingly urging said valve rod into a normal position whereby said valve is closed and fuel to be supplied to said storage tank can enter said entrance port and open said valve by movement of said valve rod against the force of said spring means and within said groove allowing passage of fuel through said second side port.

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