July 21, 1959 C. ZELLWEGER 2,895,318

LIGHTERS COMPRISING A DEVICE FOR ADJUSTING THE DELIVERY OF FUEL FEEDING THE FLAME

Filed Jan. 22, 1957

FIG. 3.

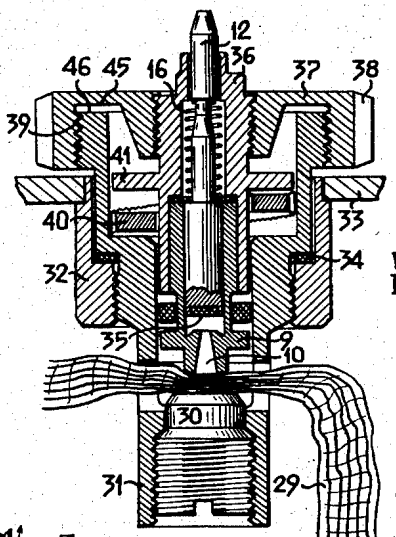



FIG. 1.

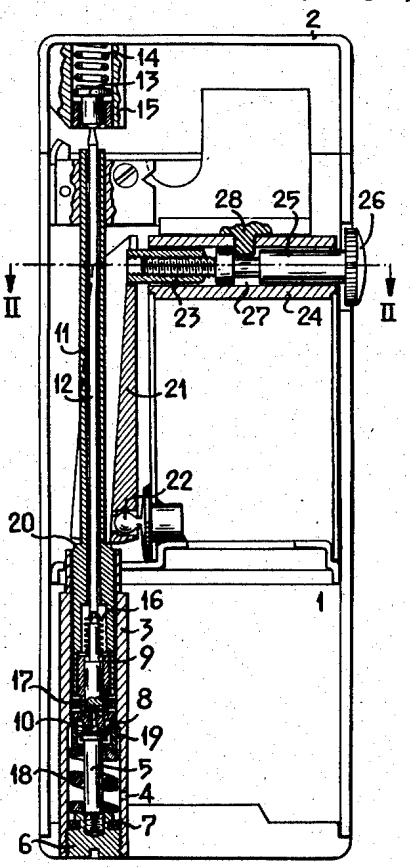
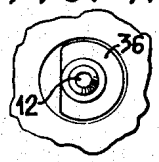



FIG. 4.



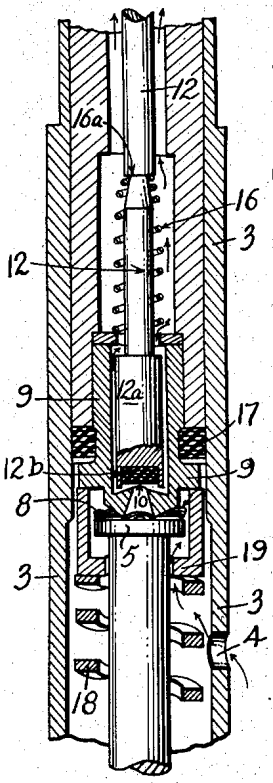




FIG. 7.

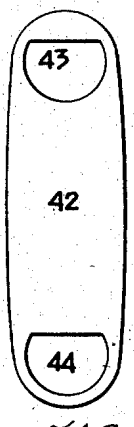



FIG. 5.

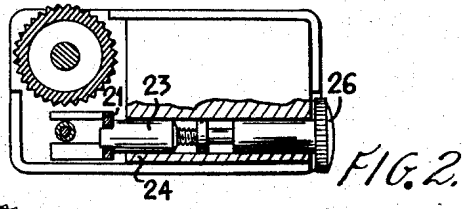



FIG. 2.

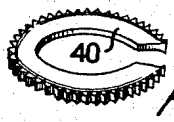



FIG. 6.

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United States Patent Office 2,895,318
Patented July 21, 1959



2,895,318

# LIGHTERS COMPRISING A DEVICE FOR ADJUSTING THE DELIVERY OF FUEL FEEDING THE FLAME

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Application January 22, 1957, Serial No. 635,521

Claims priority, application Switzerland February 8, 1956

6 Claims. (Cl. 67—87)

There are known, equally well on petrol and liquefied gas lighters, adjusting devices enabling the supply of fuel to the flame to be modified. These devices mainly consist of a wick or a porous body by means of which the capillary passage is modified by a variation of the compression.

It has been found, particularly in gas lighters that the movements to which the parts are to be subjected, for obtaining a variation of the flame from a minimum to an admissible maximum, are of the order of a few microns to some hundredths of a millimeter.

In practice these adjusting devices have the disadvantage, for the user, of being excessively sudden and necessitating, in general, the use of a tool or a spanner for the operation thereof. Further, it is difficult to adjust the flame exactly at the desired size.

On the other hand, it is advantageous, in liquefied gas lighters, to be able to adjust momentarily the supply to a value much too high for current usage, so as to cause a large quantity of gas in the liquid state to pass into the porous body and thus obtain a cleansing of the latter for removing the residues which are deposited in the body after a predetermined period of use.

The invention has for its subject a lighter comprising a device for adjusting the flame, characterised in that the said device comprises at least two actuating members for the adjustment, of which the first permits of a rapid adjustment and the second a fine adjustment.

This device permits of obtaining a fine adjustment of the flame without difficulty, and further, in the case of liquefied gas lighters, comprising a porous body for the evaporation of gas, the member for rapid control of the adjustment permits of momentarily increasing the supply in an exaggerated manner for cleaning the porous body.

One form of construction of a lighter according to the invention and a modification of a burner, are shown diagrammatically and by way of example in the accompanying drawings, wherein:

Fig. 1 is a vertical section of a lighter according to the invention.

Fig. 2 is a section on the line II—II of Fig. 1.

Fig. 3 is a section of a burner according to another form of construction.

Fig. 4 is a top plan view of a portion of the burner according to Fig. 3.

Fig. 5 shows a key for adjusting the burner according to Fig. 3.

Fig. 6 is a view in perspective of a particular washer used in the burner according to Fig. 3.

Fig. 7 is an enlarged fragmentary vertical sectional view of the valve arrangements shown in Fig. 1.

The lighter shown in Figure 1 comprises a body **1** having a means therein forming a reservoir and surmounted by pivoted cover **2**. Within the reservoir there is located an inlet tube **3** having an orifice **4** for the passage of gas in the liquid state. At the bottom of the tube **3** there is provided an adjustable abutment pin **5**



having a head at its inner end while its lower end is secured to a screw **6** capable of being actuated from the outside of the lighter body. A fluidtight joint **7** is provided on the screw **6** for preventing leakage of gas to the outside. The upper face of the abutment pin **5** serves as a valve seat against which a piece of fabric **8** may be clamped by the valve body or casing **9** having an inlet orifice **10** for supplying gas to a gas outlet tube **11**.

Within the outlet tube **11** slides a valve stem **12** whose upper end together with the mouth of the tube constitutes a burner element or head. The said upper end of the stem **12** may be displaced inwardly by the stud **13** subjected to the action of a spring **14** and located in a socket **15** of the cover **2** when the latter is closed. The lower end of the stem **12** is enlarged to form the valve proper **12***a* carrying a sealing lining **12***b* for closing the orifice **10** when the stem is pushed downward by the stud **13**. When the cover **2** is open, the stem **12** is pushed upward by spring **16** located in a recess at the bottom of the tube **11** to open the inlet orifice **10**. The upper end of the spring **16** engages an annular shoulder **16***a* on the stem while the bottom end rests on a washer clamped between the upper edge of the valve body **9** and a shoulder on the tube **11**.

The valve body **9** fitted in the lower end of the outlet tube **11** has a fluidtight washer **17** surrounding the same to prevent leakage of gas between the outlet tube **11** and the inlet tube **3** in which the outlet tube can slide. A spring **18** is located in the lower part of the inlet tube **3** and bears, at one end, against the screw **6** and at the other end against the bottom of a sliding cup **19** which has a central opening loosely fitting about the shank of stem **5** to permit passage of gas to the fabric **8**. When the screw **6** is rotated to push the valve body **9** upwardly, by means of spring **18** and cup **19**, the stem **5** is also pushed upwardly. This action tends either to maintain a constant selected pre-set distance between rigid members **5** and **9**, or to lessen the distance between them to clamp or compress the fabric **8** therebetween, in accordance with the relative position of the parts.

Above the inlet tube **3**, the outlet tube **11** is provided with a shoulder **20** against which bears a lever **21** hinged on a ball **22**. The upper end of said lever **21** engages with a sleeve **23** sliding in a bore of a wall **24** and provided with a screwed bore with which engages the end of a screw **25** forming a control member for fine adjustment. Said screw has a head **26** of which the edge is milled so as to enable it to be turned easily. Said screw has a cylindrical portion in which is provided a groove **27** to allow of axial fixing of said screw by means of a projection **28** engaging with said groove.

By causing the screw **25** to turn, an axial movement of the sleeve **23** is produced, the sleeve engaging in the upper end of the lever **21** in such a manner as not to be capable of turning relatively to the latter. This movement produces a pivoting of the lever about the ball **22**, which is translated into a very small movement of the tube **11** in the interior of the tube **3**. It is also possible to vary in a very precise manner, the distance between the parts **5** and **9**, and thus the compression applied by these parts on the piece of fabric **8**.

When the member **26** for the control of fine adjustment is screwed thoroughly, the sleeve **23** moves towards the right and abuts against the shoulder formed by the unthreaded part of the screw **25**, which limits the maximum height to which the flame can be adjusted by said member **26**. It is possible to fix a maximum useful height by acting on the member **6** for controlling rapid adjustment. This device eliminates the risk of burns derived from too high a flame at the moment of lighting the burner, especially in the case when the user has actuated the member for fine adjustment, without paying any attention,

for example mechanically during the course of a discussion.

The lower limit of the height of the flame which it is possible to obtain by means of the control member for fine adjustment, may be determined by the upper end of the lever 21 coming into contact with the tube 11. This limit may also be determined simply by the increase of the pressure to be applied to the fabric 8, said pressure making it difficult to actuate the member 26 when the fabric 8 is compressed strongly.

It will be seen that the movement transmitted to the part 9 by the member for controlling the fine adjustment formed by the screw 25, is subjected to two successive reductions, namely a reduction obtained by means of the lever 21, and a second reduction obtained by the screwing of the sleeve 23 on the screw 25. The rapid adjustment of the flame of the lighter is effected by more or less turning the screw 6, which produces a rapid movement of the part 5 relatively to the part 9.

Figure 3 shows another form of construction of a burner wherein a porous wick 29 is clamped between a supporting plug 30 and a movable valve body 9, having an orifice 10 for supplying gas to the burner. The plug 30 is screwed into the smallest diameter of a tubular shell 31 before said shell is mounted in the lighter casing. As shown, said shell 31 has its intermediate diameter screwed into a threaded boss 32 fixedly carried by wall 33 of the reservoir of the lighter, with the interposition of a fluidtight joint 34.

As in the first form of construction, the valve body 9 contains a movable stem 12 which is urged upwardly by spring 16 and which stem has its lower portion enlarged as at 12*a* with its bottom end provided with a fluidtight lining 12*b* adapted to close the orifice 10 when the stem 12 is pushed downwardly by a cover, not shown. The valve body 9 is force-fitted into a tubular regulator element 36 whose upper external portion is threaded and engages in the threaded bore of the actuating member 37, which, as shown, is in the form of a recessed disc. The actuating member 37 is intended to control the fine adjustment. The outer edge of the disc is milled at 38 and the side wall of its recess is threaded as at 39 to engage with threads on the upper part of the shell 31.

A spring washer 40 is confined in the shell 31 and bears, at one end, against the latter and at the other end, against the annular flange 41 of the regulator element 36 so as to provide friction which offers resistance to the rotation of the said regulator element relative to the shell 31. For increasing frictional resistance the washer 40 is serrated at its outer edge to provide teeth on its edge which bears against sides of the chamber of shell 31 in which it is housed. The washer 40 is shown in Figure 6 in perspective. Preferably said washer is in the form of an annular elastic strip cut to provide opposite ends which are axially displaced in opposite directions. This formation causes the washer to tend to space the valve body 9 from the plug 30. Moreover, said washer tends to cushion the pressure applied to the wick 29 by rotating the actuating disc 37.

The actuating member 37 has threads of different pitch for engagement with the regulator element 36 and the tubular shell 31, for controlling fine adjustment, so that when said actuating disc is rotated, the movement of the valve body 9 relative to the plug 30 is determined by the differential value of these threads. It is thus possible to obtain a very considerable reduction of movement of the valve body 9 for the control of the degree of compression of the wick. On the other hand, the interengaging threads on the regulator element 36 and actuating element or disc are of equal pitch.

When it is desired to effect a rapid adjustment of the flame, for example, for washing the part of the wick 29 at which the evaporation of the gas is effected, it is possible to turn the regulator 36 relatively to the actuating element or disc 37 for fine adjustment, which is held stationary.



For this purpose, the part 36 is provided, near its upper end with a part of non-circular section which is visible in Fig. 4. Fig. 5 shows a spanner 42 having two orifices 43 and 44 of which the section corresponds with that of the upper part 36, in such a manner as to permit of the use of said spanner so as to screw or unscrew the part 36 relatively to the member 37. This operation requires the use of a spanner as it necessitates a fairly strong force by reason of friction which is produced by the resilient washer 40 between the part 34 and the body 31 of the burner.

In the form of construction shown in Fig. 3, it is advantageous for the two threads of the member 37 to have left-hand pitches in order to obtain a stop limiting the movement of the member 37 so as to fix the maximum height of the flame. In fact, it is desirable that, according to use, a rotation of the member 37 in an anti-clockwise direction produces an increase in the height of the flame. This height is limited when the inner surface 45 of the member 37 comes into contact with the upper annular face 46 of the body 31. For obtaining a reduction in height of the flame, it is necessary to turn the member 37 in a clockwise direction, which corresponds, by reason of the left-hand pitch, to an unwinding of this member on the body 31. This unscrewing is limited progressively by the greater and greater force which must be applied to the member for effectively compressing the wick 29 between the parts 9 and 30.

The burner according to Fig. 3 is provided in all with three adjusting control members, as the part 30 can be screwed more or less into the body 31 of the burner, which permits of varying the tension of the spring formed by the washer 40. Said part 30 thus forms a third member for controlling the adjustment, the first two members being respectively formed by the member 37 and the part of non-circular section of the part 36.

The burner above described is very advantageous, as it consists of an assembly capable of being secured to the reservoir of the lighter, which simplifies the construction of the latter.

It will be understood that the forms of construction described may be modified considerably. The burner shown in Fig. 3 may, in particular, be provided with a sufficiently long body so as to pass through the whole of the reservoir, in such a manner that the part 30 may be screwed, more or less, into the body 31 by acting thereon from the outside. In this case it is possible to omit the spanner shown in Fig. 5 and not to impart a particular shape to the part above the member 36, as the rapid adjustment may also be obtained simply by screwing the part 30 more or less into the body 31.

It will be understood that all types of reducing means may be provided for obtaining fine adjustment, for example by using a worm, a combination of levers, planetary gears and so forth. In the forms of construction described, the fine adjustment range was smaller than that of rapid adjustment, by reason of the construction adopted, but it will be understood that the range of fine adjustment may also be at least as large as that of rapid adjustment.

Finally, the examples described relate to lighters in which the fuel is a liquefied gas, but it will be understood that analogous devices may be applied to petrol lighters.

What I claim is:

1. A gas lighter including, a casing having a body, a cover pivoted to the body, a yielding abutment on the cover, means forming a fuel reservoir, coarse fuel adjustment means including a fuel inlet tube having a fuel receiving orifice communicating with the reservoir, an abutment pin including a head and a shank, a set screw plug on the lower end of said shank, a cup fitted to the shank of said pin, a spring on the shank of the pin and confined between said screw plug and the underside of the cup, a valve body resting on the upper edge of the cup

and having an orifice facing the head of the pin, a porous element in said cup between said orifice and the head of the pin an outlet tube internally having a valve chamber and bore, a valve proper in said chamber and having a stem extending through said bore, the end of the stem opposite the valve projecting beyond the open end of the bore to be engaged by the spring urged stud on the cover when the latter is closed to cause the valve to seal the orifice member, a spring in said chamber normally biasing said valve and its stem to unseated position relative to said orifice, an external shoulder on said outlet tube; and fine fuel adjustment means including a lever fulcrumed in the casing to provide a short arm for engaging said shoulder and a long arm opposite said short arm, an internally threaded sleeve on the free end of the long arm of the lever, and a fine adjustment member rotatably supported in a fixed position in the casing and having an exposed knob and a threaded portion engaging within said internally threaded sleeve, whereby, angular adjustment of the exposed knob will cause relative minute movement of the outlet tube to vary the distance between the head of the abutment pin and the orifice member.

2. A lighter including a casing having a burner and a fuel reservoir, two relatively adjustable rigid members one of which has an opening, a tubular member establishing communication between said opening and the burner, a porous compressible fuel absorbing element between said rigid members and communicating with said reservoir, and a plurality of means operable from the outside of the casing for adjusting said rigid members to provide a coarse and fine adjustment respectively of the flame at the burner, said means for effecting coarse adjustment including one of said rigid members turnable on an axis coinciding with the axis of said opening in the other of said rigid members to selectively pre-set the members for coarse adjustment, and fine adjustment means engageable with said tubular member for producing said fine flame.

3. A lighter comprising a reservoir and a burner, means for controlling the variable height of the burner flame, said means including a porous fuel absorbing body, two rigid members for compressing said porous body between them, at least one of said members being accessible from the exterior of the reservior to be adjustable to permit a relative pre-set displacement between said rigid members to modify the extent of compressing the porous body to provide coarse fuel adjustment, and other means also accessible from the exterior of the reservoir for acting on the other of said rigid members to displace it a slight distance relative to the other rigid member to assure a more fine and precise adjustment than that obatined by the action of the coarse adjustment means.

4. A lighter including a casing having a burner and a fuel reservoir, two relatively adjustable rigid members one of which has an opening, a tubular member establishing communication between said opening and the burner, a porous compressible fuel absorbing element between said rigid members and communicating with said reservoir, and a plurality of means operable from the outside of the casing for selectively adjusting said rigid members to provide a fine and coarse adjustment of the flame, said means for effecting coarse adjustment including one of said rigid members, turnable on an axis coinciding with the axis of said opening in the other of said rigid members, and said fine adjustment means including a lever having one end engaging the tubular member, and means at the other end of said lever disposed substantially at right angles thereto and having a finger engaging portion exposed at a side of the casing.



5. In a lighter including a casing having a reservoir, a burner, a pivoted cover, means for selectively controlling the magnitude of the flame at the burner when the cover is open by regulating the supply of fuel thereto from said reservoir, said means comprising a tubular shell fitted to the casing and having openings in its lower portion communicating with the reservoir, an abutment adjustably fitted in the shell at the reservoir side thereof, a wick extending across the abutment and into the reservoir, a tubular regulator element within the shell, a hollow valve body fitted in one end of the regulator element and slidable therewith in relation to the shell and having its lower orifice end engaging the portion of the wick extending across the abutment, a stem movable in the hollow valve body and having means to seal the inlet end of the orifice when the cover is closed, a spring for moving the stem to uncover the orifice of the valve body when the cover is open; and a rotatable actuating member concentric with the tubular shell, the regulator element and the valve body, and cooperating with said valve body to effect adjustment of the regulator element: said actuating member having threads of different pitch for engagement with related threads on the tubular regulator element and the tubular shell, and the regulator element and actuating member having mating threads of equal pitch, whereby, when the actuating member is turned it will control adjustment of the flame from fine to coarse, and vice versa; and means for imposing frictional resistance between the tubular shell and the valve body.

6. A lighter according to claim 5, wherein, said regulator element also has an exposed end of non-circular cross section to enable the same to be turned by means of a spanner applied thereto, to screw on and to unscrew the valve body relative to the threads for fine adjustment and thus obtain a quick adjustment of the valve body to cleanse the wick.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,525,733 | Haskell | Feb. 10, 1925 |
| 2,737,037 | Zellweger | Mar. 6, 1956 |
| 2,737,795 | Gruber | Mar. 13, 1956 |
| 2,808,714 | Wilson | Oct. 8, 1957 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 739,940 | Great Britain | Nov. 2, 1955 |
| 1,097,435 | France | Feb. 16, 1955 |