Dec. 18, 1956 T. RUETZ 2,774,235

BURNER FOR CIGARETTE-LIGHTERS AND CIGARETTE-LIGHTERS PROVIDED THEREWITH

Filed Dec. 19, 1955 2 Sheets-Sheet 1

Fig. 1

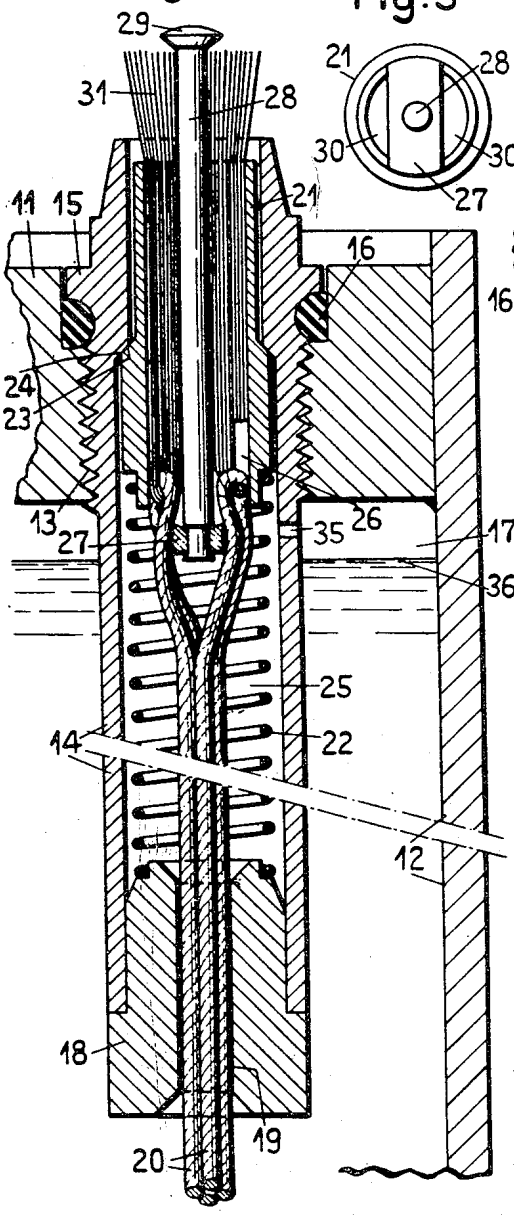

Fig. 3

Fig. 2

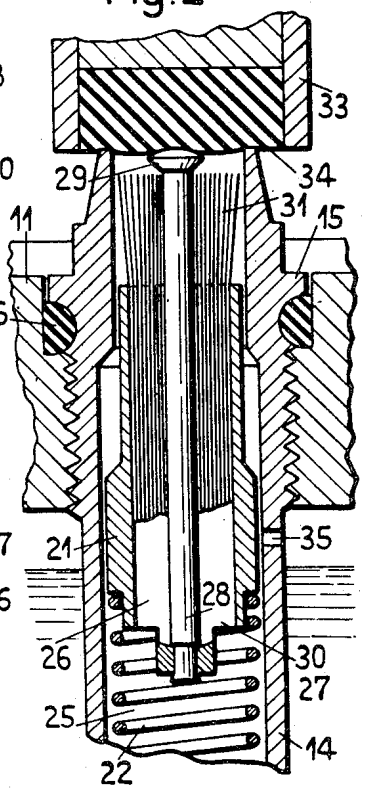

Fig. 4

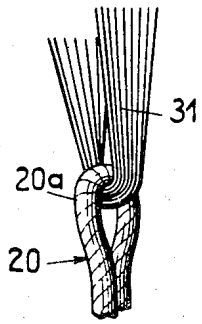

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Fig. 5

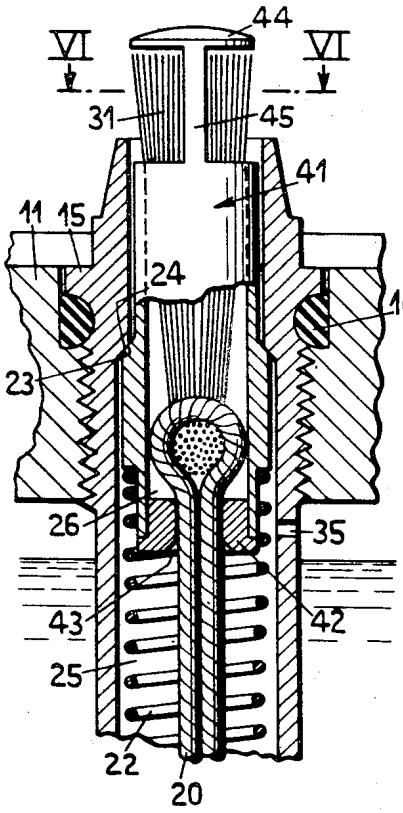


Fig. 7

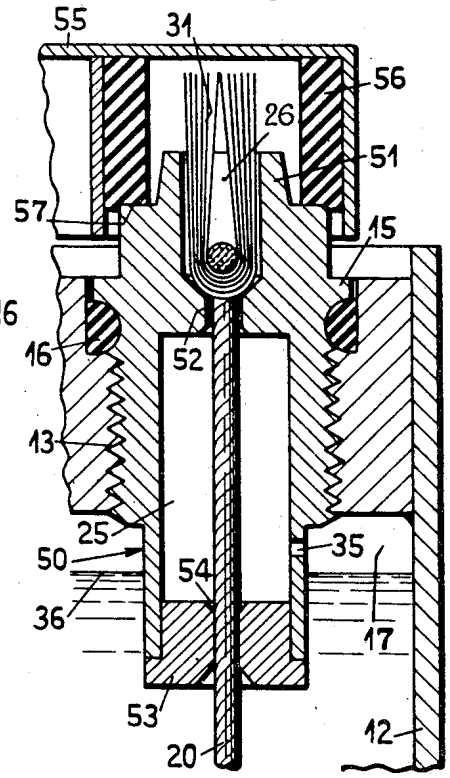
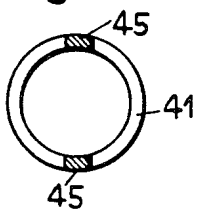


Fig. 6



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BURNER FOR CIGARETTE-LIGHTERS AND CIGARETTE-LIGHTERS PROVIDED THEREWITH

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Application December 19, 1955, Serial No. 554,014

Claims priority, application Switzerland June 27, 1955

12 Claims. (Cl. 67—53)

The present invention relates in general to cigarette or cigar lighters and has particular reference to a burner for cigarette-lighters and the like, especially pocket-lighters of the type having a liquid fuel reservoir closed to the outside, a burner and at least one fuel vehicle connecting the fuel reservoir to the burner and along which the fuel is led under the influence of the vapour pressure developing in the fuel reservoir and acting on the surface of the liquid fuel.

The burner forming the subject-matter of this invention is remarkable, notably in that the fuel vehicle extends throughout a cavity open at one end to the fuel reservoir through the medium of a pressure-reducing orifice which, in the operative conditions of the lighter, overlies the fuel surface, and at the other end to the atmosphere through a throttled passage consisting of another orifice also permitting the passage of said vehicle towards the burner, the complete assembly being so constructed and proportioned that the flow of fuel from the reservoir to said cavity takes place as a function of the differential pressure existing between the cavity and the inner volume of the fuel reservoir so that even for relatively low vapour pressures in the reservoir the quantity of fuel supplied to the burner is substantially constant.

The present invention is also concerned with novel industrial articles consisting of the various types of lighter comprising a burner of the character broadly set forth hereinabove.

Other features and advantages of this invention will become apparent as the following description proceeds with reference to the attached drawings forming part of this specification and illustrating diagrammatically by way of example preferred forms of embodiment of the invention, it being understood however that these embodiments should not be construed as limiting the scope of the invention, as many modifications may be brought thereto without departing from the spirit and scope of the invention. In the drawings:

Figure 1 is a sectional and fragmentary view showing on a relatively large scale a pocket lighter in its operative conditions;

Figure 2 is a similar view showing details of the same lighter in its inoperative conditions;

Figure 3 is an end view from below showing the burner head corersponding to the lighter illustrated in Figs. 1 and 2;

Figure 4 is a detail view showing the manner in which the wick serving as a liquid-fuel vehicle forms a loop through which a U-bent bundle of fire-proof non-porous wires are passed to lead the fuel from the wick to the place where the combustion actually takes place;

Figure 5 is a view similar to Fig. 1 showing another form of embodiment of the lighter according to this invention, in its operative conditions;

Figure 6 is a cross-sectional view of the burner head alone, the section being taken upon the line VI—VI of Fig. 5, and

Figure 7 is another form of embodiment of a pocket lighter shown in vertical fragmentary section with the burner cap in its closed position.

In the cigarette or cigar lighter illustrated in Figs. 1 to 3 a tubular member **14** having a threaded portion **13** is screwed therethrough in the top wall **11** of a fuel reservoir **12**. Between a shoulder or flange portion **15** of this tubular member **14** and a corresponding annular recess formed in the upper face of the aforesaid top wall **11** there is fitted a sealing gasket **16**. In the lower portion of the tubular member **14** extending in the inner space **17** of the fuel reservoir **12** there is spun or otherwise secured, for example by soldering a plug **18** formed with an axial passage **19** for wicks **20**. The upper portion of the tubular member **14** has slidably mounted therein a burner head **21**, a clearance of one or two thousandths of an inch being provided between these members **14** and **21**. A coil spring **22** bears with one end against the lower plug **18** and with its other end against the burner head **21**; in the operative conditions of the burner this spring **22** urges the burner head **21** upwards until a valve-forming conical shoulder **23** of the burner head **21** engages a seat-forming conical shoulder **24** formed inside the tubular member **14**, as shown. The tubular member **14**, plug **18** and burner head **21** form together a cavity **25** located immediately under the burner and containing the coil spring **22**, this cavity **25** being closed to the outside by the shoulders **23**, **24** contacting each other.

The burner head **21** has a cylindrical coaxial bore **26** and its bottom is formed with a diametral member **27** having a central hole adapted to receive the lower end of a rod **28** extending coaxially to the cavity **26** and carrying at its upper end a head **29**, as shown. On either side of the diametral member **27** apertures **30** communicating with the burner head cavity **26** (Fig. 3) are thus formed to permit the passage of the wicks **20**. A number of bundle-forming thin fire-proof nonporous wires **31**, for example of glass or other suitable material are provided in this cavity **26**. In the example illustrated these wires constitute two U-shaped bundles in which the wires are substantially parallel to one another. The bend of each bundle is formed around the top portion of a loop **20***a* formed in turn in a U-bent wick **20**, as shown in Fig. 4. The two sides of each loop **20***a* are parallel and extend through the aperture **30**, cavity **25** and orifice **19** from which they emerge into the fuel reservoir **12**. In the embodiment shown there are two U-bent wicks **20** each anchored as described to a bundle of wires **31**, the two sides of each wick passing through one or the other aperture **30** on either side of the diametral member **27**. The cross-sectional area of these apertures **30** is such that on the one hand the interengaging loops of the fire-proof wires **31** and of the wicks **20** cannot pass through the relevant aperture **30** whilst on the other hand the fuel vapour or gas can escape from the cavity **25** around the wires and wicks through these apertures **30** into the space **26** of the burner head and, therefore, to the atmosphere, while overcoming only an appreciable resistance to the gas flow.

In Figure 2 the wicks **20** and the bent portions of wires **31** have been omitted in order more clearly to show the structure of the lower portion of the burner head.

The two extremities of the fireproof wire bundle **31** emerge upwards from the space **26** of the burner head **21** but the rod **28** extends above these extremities with its head **29**. The lighter is provided with a cap shown only partly in Figure 2 and containing in a fixation socket **33** a sealing pad of resilient material **34**, for example synthetic or other fuel-resisting material. Thus, when the cap is closed the pad **34** engages the head **29** of rod **28** and the head **21** of the burner is pushed downwards against the resistance of the coil spring **22**, without permitting the upper ends of the fireproof wires **31** to contact the pad **34**.

In the closed position of the cap the pad 34, as shown in Fig. 2, engages the upper edge of the tubular member 14 and closes the latter.

In their sections extending from the reservoir 12 to the cavity 25 the wicks 20 fill the passage 19 in such a manner that the liquid cannot flow directly from the reservoir 12 to the cavity 25, and that when the liquid surface is below this orifice 19 the gas cannot escape from the inner space 17 of the reservoir to the cavity 25 through this orifice 19. Only the fuel seeping along the wicks 20 can pass through the orifice 19 but without allowing the cavity 25 to become filled up with liquid. In the peripheral wall of the tubular member 14 a lateral or radial hole 35 is formed to connect the cavity 25 to the inner space 17 of the reservoir 12 above the liquid level therein, designated by the reference numeral 36, when the lighter is positioned in its normal or vertical position. The diameter of this hole 35 may be for example 8 thousandths of an inch, in all cases relatively small so that even if the lighter is turned up side down the fuel cannot enter the cavity 25 because the air or fuel gas pressure therein prevents the passage of liquid fuel therethrough. However, the gas may pass from the reservoir space 17 through the hole 35 to the cavity 25, thereby occasionating a pressure reduction in the small hole 35. On the other hand, the fuel reservoir 12 is tightly closed, especially at the filling plug (not shown).

When the lighter cap is closed and the burner head 21 maintained downwards as illustrated in Fig. 2, one portion of the outer surface of the burner head 21 registers with the small hole 35 so as to occlude the latter.

The burner head 21, tubular member 14, plug 18 and the parts associated therewith will thus constitute a compact unit which may be removed and replaced as a whole.

The lighter constructed in accordance with the teachings of this invention and of the type described hereinabove with reference to Figs. 1 to 3 of the drawings operates as follows:

When the lighter is opened, i. e. by raising the cap 33 through any suitable or known means, the spring 22 causes the burner head 21 to be snapped to the upper position shown in Fig. 1 and the hole 35 is uncovered, thereby enabling the inner space 17 of the fuel reservoir 12 to communicate with the cavity 25. The wicks 20 had been soaked beforehand with liquid fuel and the latter had even been allowed to seep up to the loop-forming portions of the fireproof wires 31. When the lighter is held in the hand the natural heat of the hand and also, when the flame is ignited, the combustion heat, produce a certain vapour pressure above the fuel surface 36 and this pressure is higher than it was before the lighter was touched with the hand. The vapour pressure is thus propagated through the hole 35 to the cavity 25 and the tight joint formed between the conical surfaces 23, 24 prevents this pressure from being vented to the atmosphere outside the burner head 21. The pressure can only propagate through those portions of the apertures 30 in the burner head 21 which are not filled by the wicks to the interstices formed between the wires 31; due to the relatively high resistance to any fluid flow provided by these wires a pressure reduction takes place and the pressure in the cavity 25 remains higher than the atmospheric pressure while being lower than the vapour pressure in the fuel reservoir space 17, owing to the reduction in pressure at the lateral hole 35. Thus, the fuel seeping along the wicks 20 to the wires 31 will first rise by capillarity in the narrow interstices left between these wires 31, then spread around the outer surface of these wires. The aforesaid upwardly acting pressure will promote the conveying of fuel in the same direction along the wires 31 to the combustion point located just above the upper extremity of the tubular member 14. The proper vaporization of the fuel is subordinate to a convenient distribution of the fuel on the outer surface of the wires 31 to promote on the one hand the ignition thereof by means of an ignition spark, and on the other hand the combustion proper.

The vapour pressure in the space above the fuel surface 36 will also act, of course, on the fuel proper, so that the liquid fuel will be forced upwards through the interstices formed between the fibres of the wicks 20 as inside a pipe, thereby ensuring a fuel supply. The lower pressure existing in the cavity 25 will retard the delivery of fuel and this will take place as a function of the differential pressure obtaining between the cavity 25 and the inner space 17 of the fuel reservoir 12.

The vapour pressure built up within the reservoir space 17 varies with the temperature; consequently, if the hole 35 were not provided this would cause a more or less important quantity of fuel to rise along the wicks 20. Besides, in the form of embodiment of cigarette-lighter just described the reduced pressure obtaining in the cavity 25 will also vary as a function of the pressure existing in the inner space 17 of the reservoir 12, so that the action whereby the delivery of fuel is retarded will also vary with temperature. Thus, even with carrying vapour pressures in the space 17 of the fuel reservoir 12 it is possible to feed the burner with fuel at a substantially constant rate.

The essential advantage of the lighter construction set forth hereinabove lies in the safe, failure-free ignition together with a practically uniform flame volume irrespective of the temperature, due to the uniform or constant-rate fuel supply ensured by the arrangement.

The form of embodiment of a cigarette or cigar lighter of the type illustrated in Figs. 5 and 6 of the drawings differs from the embodiment just described only through the design of the burner head 41. This head 41 is closed at its lower end by a plug 42 fitted therein in a permanent fashion and formed with a single central aperture 43 through which extend the two sides of a wick 20 bent to form a loop, as shown. The loop of a U-bent bundle of wires 31 engages the wick loop, as shown. The upper ends of these wires 31 are covered by a flat head 44 connected through a pair of uprights 45 (Fig. 5) to the sleeve like portion of the burner head 41, so that the upper portions of the wires 31 at the combustion point are free between the sleeve-like portion and the head 44 of the burner head 41. The head 44 of this embodiment acts as a stop to the sealing pad 34 (see Fig. 2) of the lighter cap so that when the latter is closed the burner head 41 is pushed downwards against the resistance of the coil spring 22, without any risk of damaging the relatively thin and fragile wires 31.

The other component elements of the lighter are the same as in the first embodiment described hereinabove and described in connection with Figs. 1 to 3 of the drawings, so that they are designated by the same reference numerals. Again, the operation of this lighter is also the same.

The form of embodiment shown in Fig. 7 differs from the other two in that the burner head is not slidably mounted in a tubular member. In this modified embodiment the top wall 11 of the fuel reservoir 12 has detachably mounted therein a screw-threaded member 50 formed with a screw portion 13 and characterized in that its upper portion 51 acts directly as a burner head. As in the other embodiments described hereinabove the screw-threaded member 50 is formed with a shoulder or flange 15 engaging a gasket 16 located in a suitable recess formed in the upper face of the top wall of the reservoir 12. On the other hand, the member 50 is formed with an inner cavity 25 communicating through a passage 52 with a space 26 provided in the upper or head portion 26 of the burner, this passage 52 having threaded therein a wick 20 which, as in the embodiment shown in Fig. 5, has a loop-forming portion engaging the bend of a U-shaped bundle of fireproof wires 31 extending through the cavity 26 and projecting from the top edge of the burner head 51 with their upper extremities, as shown. The bottom of the cavity 25 is closed by a

plug 53 having a central orifice 54 receiving the two sides of the wick 20. Moreover, a pressure-reducing hole 35 is drilled in the lateral wall of the lower portion of the member 50 so that the inner space 17 of the fuel reservoir 12 above the fuel level 36 communicates with the cavity 25.

A cap 55 of any suitable or known type has fitted therein a sealing ring 56 which, in the closed position of the cap 55, engages a properly dimensioned shoulder 57 of the burner head 51 so as to surround and protect the upper portions of the wires 31 which project from the burner head. The sealing ring 56 and the cap 55 will thus provide a gas-tight closing of the burner head in the upwards direction.

This lighter operates somewhat like the other lighters described hereinabove, with the only difference that the hole 35 is not occluded when the lighter cap 55 is closed. In this case as in the preceding ones the passage 54 is filled by the wick 20 in such a manner that the liquid fuel cannot flow directly into the cavity 25.

In the various embodiments described hereinabove the thin wires 31 may be made from any suitable material. Although glass has been mentioned in this respect, it may be pointed out that metal wires may also be used for this purpose. On the other hand, the wicks 20 may be replaced by any other convenient fuel vehicle such as suction bodies, preferably in the form of cords, rods or pipes. An essential requirement to be adhered to is that the fuel vehicles must extend throughout the cavity 25 so that the pressure built up therein may retard the flow of fuel to the burner.

Moreover, it is possible to dispense with the wires 31 and utilize wicks 20 extending up to the combustion point as in conventional lighters, but in this case the wicks extend throughout the cavity 25.

According to another possible embodiment of a cigarette or cigar lighter (not shown in the drawings) a fuel vehicle, for example a wick, is adapted to supply fuel from a fuel reservoir 12 to the cavity 25 where the wick is ended, and another fuel vehicle, for example another wick, extends from the bottom of the cavity 25 to the burner. In this case a certain quantity of liquid fuel may accumulate temporarily in the bottom of the cavity 25, this quantity being conveyed from the fuel reservoir along the first fuel vehicle and subsequently from this cavity to the combustion point by the other fuel vehicle.

Although various embodiments of the present invention have been described and illustrated therein, it will be readily appreciated that many modifications may be brought thereto without departing from the principles of the invention as set forth in the appended claims.

What I claim is:

1. In a cigarette lighter provided with a fuel burner head and a tightly closed inner fuel reservoir for vaporizable fuels, the combination of a tubular member mounted inside said reservoir, lower and upper openings in said member, wick elements positioned in said lower openings with a tight fit therein, said elements having one end positioned in the fuel reservoir and extending through said tubular member to said upper opening, means mounted in said upper opening to retard the flow of fuel from said wick elements, said means forming the burner head, and means connecting said tubular member and fuel reservoir for transmitting to said wicks the pressure prevailing above the fuel level in said reservoir.

2. A cigarette lighter according to claim 1 wherein the burner head is slidably mounted in said tubular member for movement to operative or inoperative positions; resilient means being provided for urging the burner head to its operative position, said burner head being movable to obstruct said connecting means to shut off communication between said reservoir and the atmosphere.

3. A cigarette lighter according to claim 1, wherein a shoulder is formed on said burner head and a complementary shoulder is formed in said tubular member for mutual fluid tight contact.

4. A cigarette lighter according to claim 3, provided with a lighter cap which, in its closed position, forces the burner head to its inoperative position.

5. A cigarette lighter according to claim 4, wherein said burner head is provided with a rod projecting beyond the end portions of the retarding means so as to contact the cap when said cap is closed, the closing of the cap causing said burner head to slide into said tubular member.

6. A cigarette lighter comprising a closed liquid fuel reservoir, a tubular member within said reservoir, a burner slidable within said tubular member, an orifice in said tubular member adjacent the lower extremity of said burner to connect said member with said reservoir, said orifice being covered and uncovered by said burner in its sliding movements in said tubular member, said tubular member having an upper and lower opening, a plug closing said lower opening, wick elements tightly fitted in said plug and extending upwardly to the upper opening, the lower end of said wicks extending into said reservoir, fuel flow retarding means in said upper opening connected to said wick elements; cooperating shoulders on said tubular member and burner head forming a seal when in contact to prevent the escape of fuel vapors from the reservoir; spring means in said tubular member urging the head into operative position and bringing said shoulders into contact to form a seal, thereby uncovering said orifice, a rod connected to said burner head and extending above the extremity of said retarding means, a cap for said lighter, said cap urging said rod into the tubular member against the action of said spring, closing said burner head and moving said burner head past said orifice to shut off communication between said tubular member and reservoir.

7. A cigarette lighter according to claim 6 in which the rod is connected to the lower portion of the burner head.

8. A cigarette lighter according to claim 6 in which the rod is connected to the upper portion of the burner head.

9. A burner for insertion into the fuel reservoir of a cigarette lighter comprising a tubular member, said tubular member including a burner head slidably positioned therein, said tubular member having an orifice therein for establishing communication between said member and said reservoir, said orifice being covered and uncovered during the sliding movements of said burner head, upper and lower openings for said tubular member, wick elements tightly fitted into the lower opening of said tubular member, said elements extending upwardly to the upper opening, the lower extremity of said wick elements extending into said reservoir, and fuel flow retarding means in said upper opening and connected with said wick elements.

10. A burner for insertion into the fuel reservoir of a cigarette lighter comprising a tubular member, said tubular member including a burner head slidably positioned therein, said tubular member having an orifice therein for establishing communication between said member and said reservoir, said orifice being covered and uncovered during the sliding movements of said burner head, upper and lower openings for said tubular member, wick elements tightly fitted into the lower opening of said tubular member, said elements extending upwardly to the upper opening, the lower extremity of said wick elements extending into said reservoir, fuel flow retarding means in said upper opening and connected with said wick elements, and means resiliently urging said burner head upwardly to uncover said orifice.

11. A burner for insertion into the fuel reservoir of a cigarette lighter comprising a tubular member, said tubular member including a burner head slidably positioned therein, said tubular member having an orifice therein for establishing communication between said member and said reservoir, said orifice being covered and uncovered

during the sliding movements of said burner head, upper and lower openings for said tubular member, wick elements tightly fitted into the lower opening of said tubular member, said elements extending upwardly to the upper opening, the lower extremity of said wick elements extending into said reservoir, fuel flow retarding means in said upper opening and connected with said wick elements, and rod means connected to said burner head and extending above the extremity of said retarding means.

12. A burner for insertion into the fuel reservoir of a cigarette lighter comprising a tubular member, said tubular member including a burner head slidably positioned therein, said tubular member having an orifice therein for establishing communication between said member and said reservoir, said orifice being covered and uncovered during the sliding movements of said burner head, upper and lower openings for said tubular member, wick elements tightly fitted into the lower opening of said tubular

member, said elements extending upwardly to the upper opening, the lower extremity of said wick elements extending into said reservoir; fuel flow retarding means in said upper opening and connected with said wick elements; means resiliently urging said burner head upwardly to uncover said orifice, and rod means connected to the said burner head and extending above the extremity of said retarding means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,576,042	Reilly	Nov. 20, 1951
2,586,380	Quercia et al.	Feb. 19, 1952

FOREIGN PATENTS

603,755	Great Britain	June 22, 1948
827,428	Germany	Jan. 17, 1952