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MECHANISM FOR FLOW CONTROL OF GASEOUS FUEL IN A CIGARETTE LIGHTER

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Fig. 1

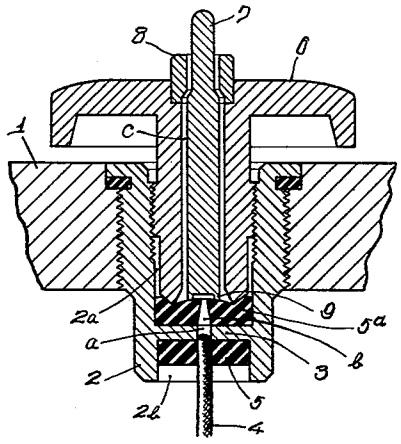


Fig. 2

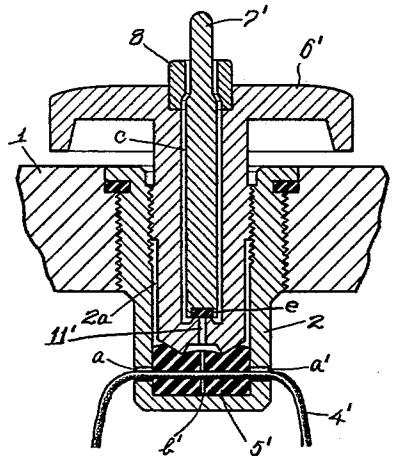


Fig. 3

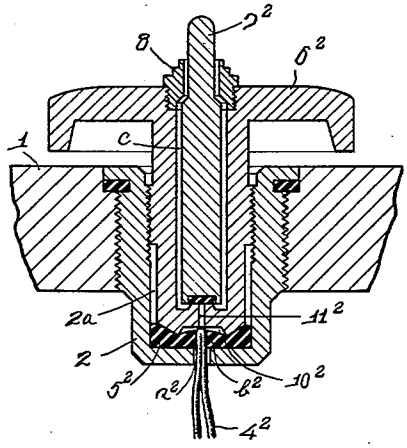
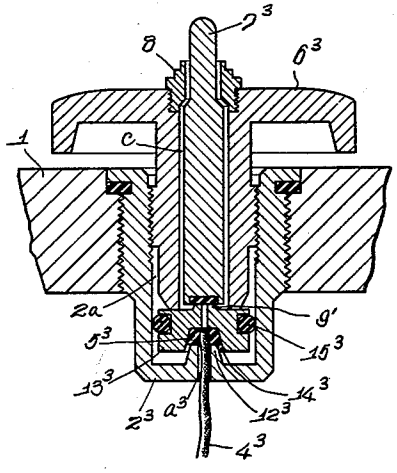


Fig. 4



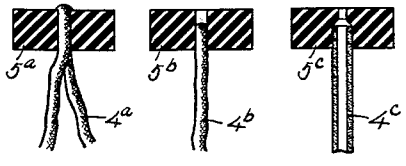


Fig. 5 Fig. 6 Fig. 7

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MECHANISM FOR FLOW CONTROL OF GASEOUS FUEL IN A CIGARETTE LIGHTER

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The present invention relates to a mechanism for flow control of gaseous fuel in a lighter, more particularly to a cigarette lighter.

In the prior art of such a mechanism for flow control of gaseous fuel in a cigarette lighter, porous materials are compressed between two rigid faces. In such a case, because of poor elasticity of porous materials, the power of restitution thereof will be gradually decreased by compression and the flow control will become incorrect during use, and while the stop valve is closed, drops of gaseous fuel will gather in a space between the control valve and the seat or in a porous material stuffed therein, which result in a disadvantage when the valve is opened for ignition, since the gaseous fuel will suddenly evaporate and instantly change the flame length to an unfavorable condition.

It is, therefore, one object of the present invention to provide a mechanism for flow control of gaseous fuel in a lighter, wherein the drawbacks of the known structure are completely eliminated.

It is another object of the present invention to provide a mechanism for flow control of gaseous fuel in a lighter, wherein non-filterable elastic materials, in which a part of wick is to be inserted, are stuffed within a cylindrical bushing, and an end of the wick faces a gas passage leading to a burning nozzle, and the opening and closing of the gas passage is effected by the compressive action of the elastic materials.

In other words, safe and comfortable use of a cigarette lighter will be assured by the present invention, because the disadvantages of the known structures are completely eliminated by means of a control member comprising non-filterable elastic materials having a control hole which can be easily opened and closed by a suitable wick and a variable compressive force, and the space between the control valve and the seat or the volume required for the elastic materials is at a minimum. The flow control is effected merely just in front of the hole, so that the accumulation of drops of gaseous fuel is prevented, in order to assure a constant and stable flame length. Since the elastic material is made of synthetic rubber and the like, the non-filtering characteristic and the power of restitution are extremely effective and the opening and the closing of the control hole will be easily effected from the periphery of the hole by the action of a movable push member, thereby bringing about such advantages that the flow control of gaseous fuel may be effected smoothly, the manual force for the flow control may be considerably decreased and the satisfactory operation of the lighter is assured.

With these and other objects in view, which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIGURE 1 is an axial section of a standard type of a lighter designed in accordance with the present invention;

FIGS. 2 to 4 are, respectively, axial sections of other embodiments of the lighter shown in FIG. 1;

FIGS. 5 to 7 are three embodiments of closing means for the hole of the elastic materials.

Referring now to the drawings, and in particular to FIG. 1, a gaseous fuel reservoir 1 has inserted therein a cylnidrical bushing 2, which is divided into an upper

chamber 2*a* and a lower chamber 2*b* by means of a horizontal partition wall 3, disposed crosswise in the cylindrical bushing 2 and having a bore at its center, and a non-filtering elastic material 5 is pressed into the lower chamber 2*b*, the elastic material 5 having an end of a wick 4 inserted therein, while a non-filterable elastic material 5^a is pressed into the upper chamber 2*a*, the elastic material 5^a having an adjustable bore *b* in its center. The bore *a* and the adjustable bore *b* are aligned relative to each other. A movable pusher member 6 having a central bore *c* is screwed to the upper portion of the cylindrical bushing 2 which defines the upper chamber 2*a*, the lower end of the pusher member 6 forming an annular edge to engage the upper face of the elastic material 5^a. A valve rod 7 is slidably fitted into the central bore *c* of the movable pusher member 6. An annular chamber is formed between the valve rod 7 and the movable pusher member 6, which chamber is adapted to communicate with the bore *b* and, thus, with the bore *a* in the lifted position of the valve rod 7, and an annular valve seat 9 is provided at the lower end of the valve rod 7, which valve seat 9 engages sealingly the elastic material 5^a around the periphery of the adjustable bore *b* of the elastic material 5^a, while the upper portion of the valve rod 7 is narrowed by a neck part of the burning nozzle 8. The upper end of the valve rod 7 is usually pushed down by a cap (not shown) of the lighter and the lower end thereof usually closes the adjustable bore *b* to prevent the discharge of gas, but when the cap of the lighter is lifted, the valve rod 7 is raised from the elastic material 5^a by means of gas pressure, so that the adjustable bore *b* is opened to flow gas to the burning nozzle 8.

According to this structure, when the cap of the lighter is lifted, gaseous liquid, the amount of which is beforehand suitably limited by means of the wick 4, flows from the bore *a* to the adjustable bore *b* in the form of vapor and enters into the annular chamber formed in the cylindrical bushing 2, where it is completely gasified and emerges through the burning nozzle 8 to be ignited.

In the case, however, when the movable pusher member 6 is pushed down, its lower edge will bite into the outer face of the elastic material 5^a, which will deform inwardly, to decrease the opening of the adjustable bore *b*. When the movable pusher member 6 returns to its lifted position, the adjustable bore *b* will be opened by the restoration of the elastic material 5^a to its former state, and the rate of opening and closing, respectively, of the adjustable bore *b* will be proportional to the amount of pressure exerted thereon, namely to the extent of movement of the movable pusher member 6.

Referring now again to the drawing, and in particular to FIG. 2, an improved embodiment of the lighter is shown, wherein in the same manner as shown in the first embodiment, shown in FIG. 1, a cylindrical bushing 2 is provided with oppositely disposed bores *a* and *a'* in the lower portion of its side wall. A non-filtering elastic material 5' having an adjustable, axially disposed bore *b'* is pressed into a chamber defined in the bottom of the cylindrical bushing 2, and a wick 4' passes horizontally through the elastic material 5' and through the bores *a'*, to be suspended down to the bottom of the gaseous fuel reservoir 1. Since the gaseous fuel sucked up by the wick 4' evaporates merely from an exposed portion of the wick 4' at the adjustable bore *b'*, no special means are required to hold the wick 4' easily and simply at an accurate position of the elastic material 5'.

In the embodiment disclosed in FIG. 1, the drops of gaseous fuel from the wick 4 are bound to gather at the bore *a*, when the bore *b* is closed, while in the embodiment disclosed in FIG. 2, such possiblity is reduced to a minimum.

The pusher member 6′ is closed at its bottom and has an axial bore 11′, while the inner end of the valve rod 7′ receives the washer *e*, adapted to close the axial bore 11′ in the innermost position of the valve rod 7′. An annular bossed portion is formed around the outer end of the axial bore 11′.

Referring now again to the drawing, still another embodiment of the lighter is disclosed in FIG. 3, wherein a non-filtering, elastic material 5^2 is pressed into the bottom of a cylindrical bushing 2 and a wick 4^2 is inserted into a bore a^2, provided in the bottom wall of the bushing 2, and into an adjustable bore b^2 of the elastic material 5^2. An axially disposed bore 11^2 is provided at the bottom center of the movable pusher member 6^2 and an annular bossed portion is formed around the outer end of the bore 11^2. A recess 10^2 is formed at the inner end of the bore 11^2 in the inner face of the bottom of the pusher member 6^2. Upon screwing down the movable pusher member 6^2 and an end of the wick 4^2 is pressed into the recess 10^2 formed in the bottom face of the pusher member 6^2, and the maximum pressing force will be effective around the periphery of the adjustable bore b^2 at the outer surface of the elastic material 5^2, so that the space in which the drops of gaseous fuel will gather, is restricted to the bore 11^2. The flow of gasified fuel may be adjusted by the action of the lower end of the movable pusher member 6^2, by opening and closing the adjustable bore b^2 of the non-filtering elastic material 5. The valve rod 7^2 functions in the same manner as disclosed in connection with FIG. 1.

Referring still further to the drawing, again another embodiment of the lighter is disclosed in FIG. 4, wherein a central boss seat 12^3 is provided within the bottom wall of a cylindrical bushing 2^3. A bore a^3 is provided at the center of the boss seat 12^3 for inserting a wick 4^3 therein. A pusher piece 13^3 is disposed between the boss seat 12^3 and a movable pusher member 6^3, a circular recess 14^3 being provided in the bottom face of the pusher piece 13^3 and the bore a^3 provides intercommunication between the cylindrical bushing 2^3 and the pusher piece 13^3. A rubber ring packing 15^3 is inserted into the peripheral surface of the pusher piece 13^3 to engage sealingly the inner wall of the cylindrical bushing 2^3, and a non-filtering elastic material 5^3, having an axial bore, is pressed into the circular recess 14^3, the elastic material 5^3 having the wick 4^3 inserted therein and the latter extending through the bore a^3. The elastic material 5^3 is pressed between the pusher piece 13^3 and the boss seat 12^3, and this compressed condition will continue even when the pressure due to the movable pusher member 6^3 is not effective, so that an excessive flame length will not occur, when the movable pusher member 6^3 is excessively lifted. The pusher piece 13^3 is pressed inwardly by rotating the movable pusher member 6^3 when required, thereby pressing the elastic material 5^3 onto the boss seat 12^3, yet, the boss seat 12^3 can be made considerably smaller, compared with the rotating wheel of the movable pusher member 6^3, so that the force required for the pressing will be considerably decreased for controlling the pressure exerted on the elastic material 5^3. The valve rod 7^3 operates in the same manner as in the previously described embodiments.

FIG. 5 is a fragmentary view of the elastic material 5^a on the upper surface of which the wick 4^a is exposed.

FIG. 6 is a similar view of the elastic material 5^b where the wick 4^b is inserted in a bore of the elastic material 5^b.

FIG. 7 is again a similar view of the elastic material 5^c in which the wick is replaced by a tube 4^c of small diameter. The material of the wick and the cross section area are dimensioned in such manner to generate the flame length at a low temperature under the condition that the bore is not reduced by the movable pusher member.

While I have disclosed several embodiments of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

I claim:

A mechanism for the flow control of gaseous fuel in a lighter, comprising a gaseous fuel reservoir having an opening, a cylindrical bushing sealingly inserted in said opening of said gaseous fuel reservoir, a wall disposed crosswise in the bottom portion of said bushing, said wall having an axially disposed bore, a first, non-filtering, elastic material disposed on the upper side of said wall, a second, non-filtering, elastic material disposed on the lower side of said wall, said first and said second non-filtering, elastic material having an axial bore extending therethrough, said axial bore of said first, non-filtering, elastic material having a changeable open cross-section, fuel feeding means received in said axial bore of said second, non-filtering, elastic material and extending into said gaseous fuel reservoir, a hollow pusher member screwed into the upper portion of said cylindrical bushing, the lower end of said pusher member forming an annular seat for engagement with and exerting axial downward pressure upon said first, non-filtering, elastic material and to control the flow of gaseous fuel into said pusher member, a valve rod slidably received in said hollow pusher member and defining an annular chamber with the latter, said annular chamber communicating with said bore of said wall through said axial bore of said first, non-filtering, elastic material and in turn with said axial bore of said second, non-filtering, elastic material, the lower end of said valve rod having an annular valve seat, a burner nozzle surrounding the upper end of said valve rod, the latter being adapted to be pressed downwardly in its inoperative position and to permit feeding of gaseous fuel to said burner nozzle in its operative position, upon lifting said valve rod from said first, non-filtering, elastic material, through said bore of said crosswise disposed wall and through said bore of said first, non-filtering, elastic material into said annular chamber.

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