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REDUCING AND CLOSING VALVE FOR PYROPHORIC LIQUID GAS LIGHTERS

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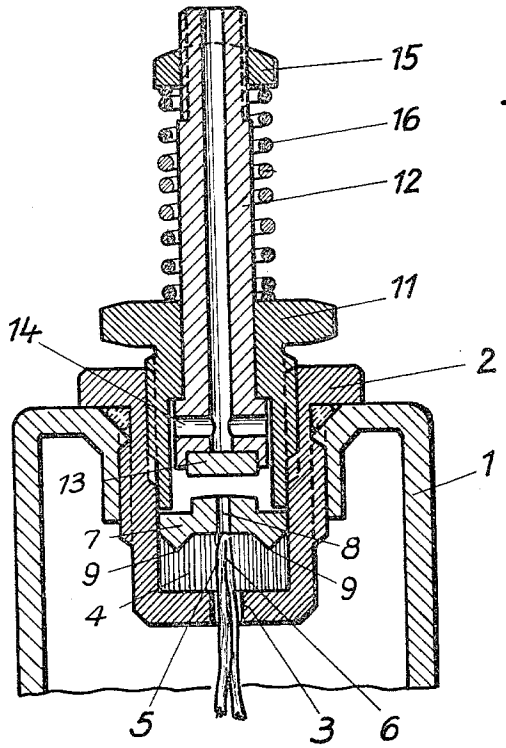


Fig.1

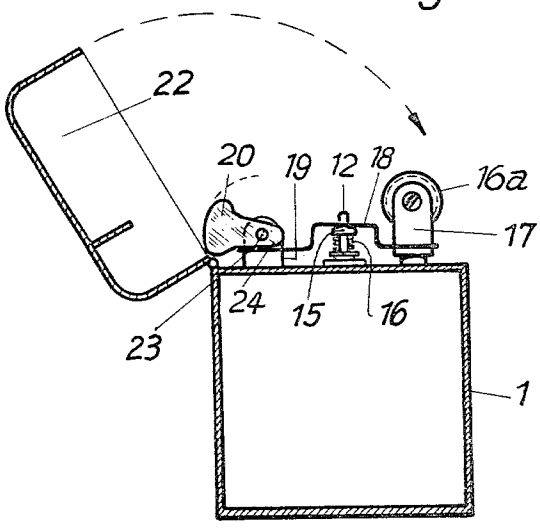


Fig.2

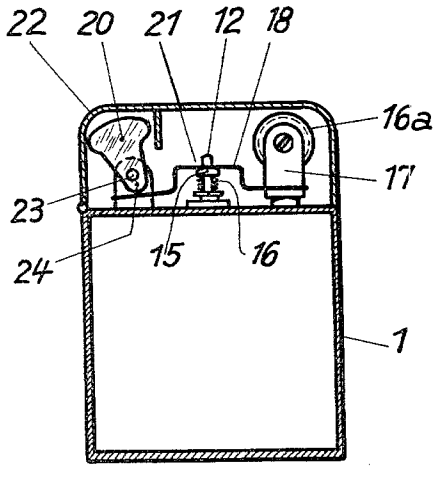


Fig.3

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REDUCING AND CLOSING VALVE FOR PYROPHORIC LIQUID GAS LIGHTERS

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This invention relates to a reducing and closing valve for lighters using pyrophoric liquid gas for fuel. Many types of such lighters are known in which complicated means are provided for reducing the gas pressure in various ways and for adjusting the size of the flame. The small dimensions of lighters, no matter whether it is the case of pocket lighters or table lighters, require complicated solutions which in most cases necessitate precision-machined valves and reducing means.

For the sake of simplification it has then been proposed to construct the gas discharge passage from the fuel container, which in most cases contains liquefied gas, as narrow as a capillary and to further reduce the cross section of the capillary opening by introducing one or more threads into the capillary. A further reduction has been obtained by the provision of a constriction in the capillary. Due to the fact that the gas discharge passage is as narrow as a capillary, flame adjustment to various climatic conditions has been achieved by very simple means. Flame size adjustment by means of the constriction in the capillary is a delicate operation requiring great skill.

Hence arose the new problem to further simplify the adjustment and to make it regulable up to complete closure, while maintaining the principally inexpensive form of construction, Adjustment by means of a constriction in the capillary can only be carried out under medium temperature and pressure conditions and this simple and inexpensive construction provides no facility for changing the size of the flame under conditions different from those under which the initial adjustment has been carried out.

It is a further object of the present invention to provide an adjusting and closing valve which permits the flow of the gas to be shut off by means of a unilaterally mounted lever controlled by an eccentric move up and down for closing and opening the valve.

This and the aforementioned objects have been achieved by providing a packing of polytetrafluoroethylene or another resilient plastic within an apertured cup-shaped insert which packing is provided with a bore as narrow as a capillary the cross section of which is further reduced by introducing one or more threads. In this construction the constriction in the capillary is dispensed with. The packing with the threads extending through its bore can be compressed by means of a screw, thereby to be deformed as a function of the exerted pressure to such as extent that the threads will more or less be pressed together and allow to pass only the gas required for the adjusted flame size. The deformation may be increased until the bore in the packing is completely closed.

In this manner, the constriction in the capillary is dispensed with and the adjustment can be carried out in a simple manner during the manufacture. Moreover, this design also enables the user to subsequently change the size of the flame, if required. A further advantageous result will be obtained when the construction according to the invention is used with fuel containers provided with a closable filling aperture for refilling it with liquefield gas, since the gas discharge passage can either be completely closed or a small passage be left for ventilation during refilling.

Shutting off the gas stream is obtainable by means of the aforementioned lever, one end of which is mounted

below the spark wheel holder while its free end is adapted to be moved up and down by an eccentric controlled by the cap of the lighter. The eccentric is so arranged that when the cap of the lighter is closed the lever will operate a valve stem to force a sealing member attached to the lower end thereof against the valve seat, thereby to shut off the gas stream. When the cap of the lighter is opened, the eccentric is operated to release the lever thereby to open the valve with the aid of a spring surrounding the valve stem and biasing same to keep the valve opened.

An embodiment of the invention will now be described by way of example and with reference to the accompanying drawing, in which:

FIG. 1 is a cross section on an enlarged scale through a reducing and closing valve incorporated in a pyrophoric liquid gas lighter according to the invention;

FIG. 2 is elevational view, partly in section, showing in particular the reducing and closing valve in relation to an associated lever and an eccentric with the lighter cap in its open position, and

FIG. 3 is a similar view with the lighter cap in its closed position.

FIG. 1 shows a reducing and closing valve as proposed by the invention, which is incorporated in a lighter. More specifically it is attached to a liquid gas container 1 in the body of the lighter. An internally threaded cup-shaped insert 2 is secured to the top end of the container 1 and provided with an aperture 3 in its bottom. A packing 4 of polytetrafluoroethylene or another resilient plastic is fitted in the cup-shaped insert 2 at the bottom end thereof and has a central bore 5 which is as narrow as a capillary and serves to accommodate one or more threads 6, for example of glass, secured to the end of the packing 4 remote from the container 1. The free ends of the threads 6 pass through the aperture 3 in the cup-shaped insert 2 and project into the container 1 and thus are immersed in the liquefied pyrophoric gas therein. A thrust transmitting pad 7 is located above the packing 4 and provided with a narrow central bore 8 and with an annular projection 9 at its end facing the packing 4. A screw member 11 is threaded into the cup-shaped insert 2 and accommodates a tube 12 designed as a valve stem and leading to the burning point. The end of the tube 12 facing the pad 7 carries a sealing member 13 above which the tube 12 is provided with passages 14 for the gas. A collar 15 secured to the tube 12 near its end remote from the container 1 forms an abutment for a spring 16 which with its other end bears against the free end face of the screw member 11 to retain the tube 12 in its open position.

FIG. 2 shows the lighter in its open condition ready for operation. A spark wheel holder 17 carrying a spark wheel 16*a* projects from the container 1 filled with liquefied gas and has a lever 18 secured thereto. At its opposite end, the lever 18 freely extends below an eccentric cam level 20 mounted for rotation about a pivot 23 on a bearing pedestal or mount 19 secured to the top of the container 1. The middle portion of the lever 18 is provided with an aperture 21 for the tube 12 passing therethrough. Since the collar 15 on the tube 12 has an outer diameter which is larger than the inner diameter of the aperture 21, it engages the underside of the lever 18 under the action of the spring 16 so that the valve is kept open. The lighter is provided with a cap 22 and when this cap is closed the eccentric 20 will turn about its pivot 23 into a substantial vertical position, as shown in FIG. 3, and a cam edge 24 of the eccentric 20 forces the lever 18 and thus the tube 12 downwardly against the thrust exerted by the spring 16, and blocks the flow of gas.

In the closed condition of the lighter, shown in FIG. 3, the narrow central bore 5 in the packing 4 (FIG. 1)

and the narrow bore 8 in the pressure transmitting pad 7 form a continuous channel extending up to the mouth of the tube 12.

When the screw member 11 is tightened, pressure is exerted on the packing 4 through the thrust transmitting pad 7. The packing 4, when subjected to pressure, sealingly engages the inner wall of the cup-shaped insert 2 but cannot expand in diameter nor upwardly or downwardly. Therefore, the packing 4 of polytetrafluoroethylene or another resilient material can only reduce the cross section of the bore 5 occupied by the threads 6. Due to the special properties of the material used for the packing 4, this reduction of the cross section of the bore 5 can be utilized, on the one hand, for regulating or adjusting the size of the flame and on the other hand, for completely closing the bore 5 in the packing 4, namely when the pressure is increased by further tightening the screw member 11 so that the pressure is transmitted through the pad 7 onto the packing 4.

It has already been mentioned that one or more threads 6 extend through the bore 5 in the packing 4. The capillarly spaces formed between the threads 6 can feed liquid fuel only along the threads through the bore 5. In this manner it is ensured that the flame will burn economically and maintain the adjusted size.

If, however, the threads 6, which are introduced for narrowing the capillary, are provided only in the region of the bore 5, i.e. are not immersed in the liquefied gas in the container 1, the surprising result will be obtained that when the lighter is held in a vertical position only gaseous fuel will escape at a rate to which the burner head, not shown, is adjusted.

When the container 1 is in an inclined position, for example, when the lighter is held obliquely or tilted, liquefied gas will enter the bore 5. The threads 6 arranged in the bore 5 will then come into contact with the liquefied gas to produce, when ignited, a flame many times greater than the ordinary flame, which is preferred especially for lighting pipes.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

I claim:

1. A pyrophoric liquid gas lighter comprising a casing adapted to contain gas and having an upper end wall, said end wall having an opening, an insert fitted in said opening and extending into the casing, capillary passage means provided in said insert for the flow of gas from said casing, means for varying the cross-sectional area of the passage means to regulate the flame of the lighter, said last means including an actuating member mounted in said insert for axial vertical movement in said insert and having a vertical bore, a capillary tube serving as a valve stem slideably mounted in the bore of the actuating member and having an upper end extending above the end wall of the casing, abutment means on the exterior of the tube below its upper end, said tube having a closed lower end for closing off said passage means, said tube and said actuating member having means for the flow of gas from the passage means up through the tube when the tube is in a raised position and the lower end thereof uncovers the passage means, spring means between said actuating member and the abutment means for urging the tube to a raised position, an actuating lever for the tube having an intermediate portion and opposing end portions, means fixing one of the end portions to the end wall of the casing, said intermediate portion engaging said abutment means, said other end portion of the actuating lever being free, a mount upstanding from the end wall, a cam lever eccentrically pivotally mounted on said mount on the end wall for pivotal movement about an axis transverse to the end wall, said cam lever having a lower cam edge, below its pivot axis, bearing on the free end portion of the actuating lever, a cover having an edge portion, said cover being pivotally attached at its edge portion to the casing at the end wall for pivotal movement about an axis transverse to the end wall for movement between open and closed positions, said edge portion of the cover engaging said cam lever in the movement of the cover to a closed position to cause the cam edge to depress the actuating lever and move the tube downwardly, against the action of the spring means, and close off the capillary passage means.

2. A lighter as claimed in claim 1, wherein said actuating lever lies above and substantially parallel with the end wall and has its fixed end portion and free end portion located on opposite sides of the tube.

3. A lighter as claimed in claim 2, wherein said means fixing the fixed end portion of the actuating lever to the end wall includes a pedestal upstanding from the end wall, a spark wheel rotatably mounted on the pedestal and means attaching the fixed end portion to the pedestal below the wheel.

4. A lighter as claimed in claim 2, wherein said intermediate portion of the actuating lever has an aperture of a diameter greater than the external diameter of the tube and through which the tube slideably passes, said aperture being of a lesser diameter than the abutment means whereby said intermediate portion bears on the abutment means.

5. A lighter as claimed in claim 4, wherein said intermediate portion is raised out of the planes of the end portions of the actuating lever.

6. A lighter as claimed in claim 1, wherein said cam lever has an upper portion above the pivot axis, said upper portion being the major portion and defining a weight, which, due to the eccentric mounting of the cam lever, swings away from the tube with the cover when the cover is opened and is then engaged by the cover edge portion, as the cover is closed, to cause the cam edge to depress the actuating lever.

7. A lighter as claimed in claim 1, wherein said gas flow means from the passage means up through the tube includes the provision of radial ports in the tube above the lower end thereof and communicating with the interior of the tube, said tube at and above the lower end thereof being of a lesser external diameter than the internal diameter of the adjoining encircling portion of the bore in the actuating member for the flow of gas to the ports.

8. A lighter as claimed in claim 1, wherein stop means is provided between the tube and the actuating member to limit the upward movement of the tube.

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