PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Burners for Liquefied Gas Lighters

We, LA NATIONALE S.A., a Company organised under the laws of Switzerland, of 2, Rue des Falaises, Geneva, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Burners are already known for liquefied gas lighters comprising a body having a recess in which is mounted a movable part adapted to control the flow of gas, means being provided for displacing the said movable part in order to adjust the supply of gas to the burner.

The movements which must be effected by the movable part for obtaining an adjustment of the flame within the usual limits, for example for varying the height of the flame from 5 mm. to 3 cm., are very small. In some types of construction these movements are of the order of a few hundredths of a millimeter. Consequently it is difficult to obtain an easy and gradual adjustment of the height of the flame and it is necessary to obtain a very high reduction between the movement of the manual control member acting on the movable part and the displacement of the latter.

The present invention relates to a burner of simple construction and permitting of an easy and very gradual adjustment of the supply of gas. Said burner is characterised in that the movable part has a surface inclined relatively to another surface of the body of the burner, at least one movable element, subjected to the action of an operating member, being placed between these two inclined surfaces and bearing against them in such a manner that a movement of the said element produces a movement of the movable part relatively to the body of the burner.

Figures 1 to 3 of the accompanying drawings show diagrammatically and by way of example an axial section of three forms of construction of the burner according to the invention.

The burner shown in Fig. 1 comprises a body 1 having a threaded portion 2 for screwing into a wall 3 of a reservoir of the liquefied gas lighter. A washer 4 ensures fluidtightness between the wall 3 and the body 1 of the burner. The body 1 has a central recess 5 in which is mounted a movable part 6 adapted to exert a pressure on a porous body 7 constituted by a cotton wick. The porous body 7 is clamped between the lower end of the part 6 and a ball 8 which is lodged in the bottom of the recess of the body 1. A transverse bore 9 permits of obtaining two opposed orifices for the passage of the porous body 7. The part 6 is provided, in the known manner, with an orifice 10 at its lower end, disposed in such a manner as to be opposite the porous body 7 so as to allow the liquefied gas soaking said latter to evaporate and to reach the upper part of the burner in the gaseous form. The orifice 10 may be closed by a rod 11 carrying a resilient pad 12 at its lower end and adapted to be pushed against the orifice 10 (position shown in the drawing) by a closure member, said latter being generally constituted by the cover of the lighter. The fluidtightness between the body 1 and the movable part 6 is ensured by a resilient ring 13 lodged between two truncated surfaces 14 and 14*a* of the body 1 and the movable part 6 respectively.

The upper part of the body 1 of the burner has a threaded bore 15 into which is screwed an operating member 16 having a central bore 17 through which passes the upper end of the rod 11. The circular edge 18 of the operating member 16 is fluted in such a manner as to be capable of being turned either directly by hand or, preferably, by means of a circular part of larger diameter, having a milled outer edge, and a central fluted bore of corresponding shape. This part has not been shown in the drawing so as not to overload the latter.

The operating member 16 is also provided with an inclined surface 19 constituting a por-

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tion of a cone co-axial to the axis of movement of the movable part 6. Said part 6 has a surface 20 inclined relatively to another surface 21 of the body 1 of the burner. The surfaces 20 and 21 are both portions of cones co-axial to the axis of movement of the movable part 6. A number of balls 22 are located along a circular track in such a manner as to bear simultaneously against the three surfaces 19, 20 and 21.

The construction described permits of obtaining a very large reduction between the axial movement of the part 6 and that of the operating member 16. It will be seen that when the latter is screwed into the threaded bore 15, the surface 19 moves downwards whilst turning about the principal axis of the burner. This downward movement of the surface 19 has the effect of pushing the balls 22 outwardly but as these latter bear against the surfaces 20 and 21, this outward displacement of the balls is necessarily accompanied by a downward movement of the movable part 6. It will be understood that it is possible to impart to the ratio of reduction, any desired value by modifying the respective inclinations of the different surfaces 19, 20 and 21. The fluidtight ring 13, by reason of its disposition, exerts on the part 6 a return force upwards. Further, the angle included between the bearing surfaces 20 and 21 for the balls 22 is sufficient to enable a reversible transmission between the movement of the balls 22 and that of the movable part 6. In the case in which the movable elements are balls, it is necessary that the angle included between the surfaces 20 and 21 is at least twice as large as the angle of friction for that surface which has the lower coefficient of friction with the balls.

Fig. 2 relates to a modification of a burner of which the whole of the lower part is similar to that of the burner shown in Fig. 1. There is again provided the body 1 having a screw thread 2, a recess 5, two orifices 9 and a ball 8. In the recess 5 is located a movable part 6 of which the shape is slightly modified relative to that in Fig. 1, a ring 13 being provided between the part 6 and the body 1 for ensuring fluidtightness and applying at the same time a return force upwardly to the part 6. It will be seen that the upper face of the part 6 is a plane annular surface on which is disposed a ring of balls 22. The upper part of the body of the burner has a threaded bore 15 into which is screwed a cylindrical part 23 said part having an internal thread 24 into which is screwed the operating member 16 of which the shape is practically the same as that of the member 16 according to Fig. 1. The lower face 25 of the part 23 is annular and in the form of a portion of a cone, and as in the first form of construction, the operating member 16 has a surface 19 in the form of a cone, which extends within the row of balls 22 in such a manner as to come into contact with them and to push them radially outwards so that they penetrate between the plane annular surface of the movable part 6 and the annular face 25 of the cylindrical part 23 whilst spacing these two parts from one another.

In this latter form of construction, it will be seen that there are available two possibilities for effecting the adjustment of the height of the flame of the burner by varying the distance between the movable part 6 and the ball 8. One of these possibilities consists in causing the cylindrical part 23 to turn in such a manner that the axial movement of said part is transmitted directly by the balls 22 to the movable part 6. The second possibility consists in acting on the operating member 16 of which the function has already been explained. By suitably selecting the inclinations of the different surfaces bearing against the balls 22, it is possible to obtain a very gradual adjustment when acting on the member 16 and a very rapid ~~adjustment~~ when acting on the cylindrical part 23. Further, this form of construction is very advantageous, as, by reason of the possibility of moving the part 23 axially over a relatively large distance, it is possible to provide ~~very~~ large machining tolerances for the different parts forming the burner.

Fig. 3 represents another form of construction in which the body 1 of the burner has radial holes 26 in each of which is located a push rod 27 of which the length is greater than the depth of the hole. In Fig. 3 a single hole and single push rod 27 have been shown, but in practice the burner should be provided with at least three, regularly distributed round the circumference. One end of the push rod 27 projects into the interior of the recess 5 of the body 1 of the burner so as to bear on a surface 20 of the movable part 6. This surface 20 is disposed obliquely relatively to the direction of movement of each push rod. The other end of the latter projects exteriorly from the body 1 of the burner and bears against a surface 28 of the general shape of a portion of a cone which is provided in the interior of a ring 29 constituting an operating member. This ring has a threaded bore 30 which permits of screwing it on the corresponding thread of the body 1 of the burner.

In this form of construction the rod 11, which permits of closing the orifice 10 provided in the movable part 6, is located completely in the interior of said part 6, said latter comprising at its upper part a closing member 31 forced into a recess 32 of the part 6 and adapted to co-operate with a shoulder 33 of the rod 11 so as to prevent the latter from leaving the interior of the part 6.

It is to be observed that in the three forms of construction described, all the parts constituting the body of the burner are bodies of revolution and that the inclined surfaces 20 and 21 are concentric surfaces of revolution.

Consequently there result considerable advantages from the point of view of fabrication, as all these parts can be obtained by turning, for example on automatic lathes.

It will be understood that it is possible to provide other forms of construction of the subject of the invention and that, for example, the disposition of the porous body on which the movable part has to apply pressure, may be very different from the construction shown in the drawing. The movement of the movable part may also be provoked by a single movable element subjected to the action of an operating member and bearing against two surfaces inclined one relatively to the other, one of these surfaces being provided on the movable part and the other on the body of the burner. The movable element may have quite different shapes from those shown and, particularly, the shape of a wedge having two plane surfaces adapted to bear against the movable part and the body of the burner.

In the forms of construction according to Figs. 1 and 2, the operating member 16 may also be screwed on to the movable part 6 and not into the body 1 of the burner. In this case, it is possible to provide parts co-operating between the movable part 6 and the body 1 so as to prevent a rotation of one of said parts relatively to the other.

WHAT WE CLAIM IS:—

1. A burner for liquefied gas lighters comprising a body having a recess in which is mounted a movable part adapted to control the flow of gas, means being provided for displacing the said movable part in order to adjust the supply of gas to the burner, characterised in that the movable part has a surface inclined relatively to another surface of the body of the burner, at least one movable element, subjected to the action of an operating member, being placed between these two inclined surfaces and bearing against them in such a manner that a movement of the said element produces a movement of the movable part relatively to the body of the burner.

2. A burner according to claim 1, characterised in that the wall of the recess of the body of the burner is a surface of revolution, the movable part being a body of revolution, the two surfaces inclined one relatively to the other being concentric surfaces of revolution, at least one of these surfaces being a portion of a cone coaxial to the axis of movement of the movable part.

3. A burner according to claim 1 or claim 2, characterised in that the angle measuring the inclination of one of said surfaces relatively to the other is large enough to enable a reversible transmission between the movement of the movable element and the movable part.

4. A burner according to any of claims 1 to 3, characterised in that the operating member also has a surface constituting a portion of a cone coaxial to the axis of movemet of the movable part, a number of movable elements being disposed along a circumference, each of these elements bearing simultaneously against the two inclined surfaces and against the conical surface of the operating member.

5. A burner according to any of claims 1 to 4, characterised in that the operating member has a threaded part coaxial to the axis of the recess of the body of the burner, the movable elements being constituted by balls.

6. A burner according to claims 1 to 5, characterised in that the movable part has a plane annular surface on which is disposed a ring of balls, a cylindrical part having an external thread and an internal thread, being screwed into a corresponding threaded bore of the body of the burner, said cylindrical part having an annular face in the form of a portion of a cone, the operating member being screwed into the interior of the cylindrical part and having a gas outlet orifice and a surface in the form of a cone which extends within the ring of balls in such a manner as to come into contact with them and to permit of pushing them radially outwards so that they penetrate between the plane annular surface of the movable part and the annular face of the cylindrical part, whilst separating these two parts one from the other.

7. A burner according to claim 1, characterised in that the body of the burner has radial holes in each of which is located a push rod of which the length is greater than the depth of the hole, one of the ends of the said push rods projecting into the interior of the recess of the body of the burner so as to bear on a surface of the movable part, said surface being disposed obliquely relatively to the direction of each push rod, the other ends of the said push rods projecting outwardly from the body of the burner, the operating member being constituted by a ring screwed around the body of the burner, said ring having an internal surface in the general shape of a portion of a cone which bears against the outer ends of the said push rods.

8. Burners for liquefied gas lighters according to any one of the preceding claims, substantially as hereinbefore described and as shown in any of the figures of the accompanying drawings.

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Consequently there result considerable advantages from the point of view of fabrication, as all these parts can be obtained by turning, for example on automatic lathes.

It will be understood that it is possible to provide other forms of construction of the subject of the invention and that, for example, the disposition of the porous body on which the movable part has to apply pressure, may be very different from the construction shown in the drawing. The movement of the movable part may also be provoked by a single movable element subjected to the action of an operating member and bearing against two surfaces inclined one relatively to the other, one of these surfaces being provided on the movable part and the other on the body of the burner. The movable element may have quite different shapes from those shown and, particularly, the shape of a wedge having two plane surfaces adapted to bear against the movable part and the body of the burner.

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2. A burner according to claim 1, characterised in that the wall of the recess of the body of the burner is a surface of revolution, the movable part being a body of revolution, the two surfaces inclined one relatively to the other being concentric surfaces of revolution, at least one of these surfaces being a portion of a cone coaxial to the axis of movement of the movable part.

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6. A burner according to claims 1 to 5, characterised in that the movable part has a plane annular surface on which is disposed a ring of balls, a cylindrical part having an external thread and an internal thread, being screwed into a corresponding threaded bore of the body of the burner, said cylindrical part having an annular face in the form of a portion of a cone, the operating member being screwed into the interior of the cylindrical part and having a gas outlet orifice and a surface in the form of a cone which extends within the ring of balls in such a manner as to come into contact with them and to permit of pushing them radially outwards so that they penetrate between the plane annular surface of the movable part and the annular face of the cylindrical part, whilst separating these two parts one from the other.

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