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(54) IMPROVEMENTS RELATING TO SMOKERS' LIGHTERS

(71) We, RONSON PRODUCTS LIMITED, a British Company, of Leatherhead, Surrey, 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:—

This invention relates to smokers' lighters and in particular to the type of lighter in which a main fuel is ignited by means of a secondary fuel.

Lighters of this general type use liquified butane or some similar liquified petroleum gas as the main fuel. The secondary fuel is pyrophoric or hypergolic, that is to say, a fuel of the type which ignites on contact with air or with the main fuel. There is a demand for a smokers' lighter which is very slender and rod shaped. Such a shape presents difficulties in effecting a satisfactory ignition by means of a secondary fuel because in such a narrow housing the two containers for the different fuels must be positioned one above the other. This in turn leads to a layout in which the fuels from the two containers are delivered along paths which are close to being parallel, thereby reducing the possibility of mixing and therefore of ignition.

The present invention provides a smokers' lighter of the kind in which a secondary fuel is used to ignite a main fuel and the lighter has a cover plate which is formed with an aperture through which at least the main fuel passes to atmosphere, the aperture serving to locate, upon ignition of the main fuel, a stable flame, wherein the main secondary fuels issuing as streams from respective containers are directed towards the inner face of the cover plate along substantially parallel axes and the said inner face is shaped to cause the fuel streams to converge in the vicinity of the aperture.

The present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic view partly cut away showing a slender, rod-shaped lighter according to the present invention,

Figure 2 is a plan view of the lighter shown in Figure 1,

Figure 3 is a fragmentary view of the inner face of the cover plate of the lighter of Figures 1 and 2, and

Figure 4 is a fragmentary section of an alternative construction of a lighter according to the present invention.

The lighter shown in Figures 1, 2 and 3 is made in two parts to facilitate assembly. The upper part 1 houses the ignition mechanism and the lower part 2 houses a burner valve 3 and main fuel container 4. The lighter is operated by a control member 5. The main fuel gas issues from the container 4 only when the burner valve 3 is in its open condition. The quantity of fuel and hence the ultimate flame height is determined by the setting of the burner valve 3. Adjustment of the gas flow through the burner valve, and therefore, the flame height, is achieved by an adjustment lever 6 which can be rotated through a small angle about the axis of the burner valve 3. Movement of a stem 7 of the burner valve 3 in an upward direction opens the valve to allow gas to flow from the container 4.

Upon release the stem moves downwardly under spring pressure to resume its rest position where it prevents further gas flow. The stem is secured on one side of a connector 8 to the other side of which is secured a tube 9. This tube carries a circlip 10 which is engaged by the end of a fork lift member 11 when the control member 5 is operated whereby to lift the tube 9, connector 8 and stem 7 to allow gas to flow through the burner valve 3.

A cover plate 12 which provides a decorative outer surface is formed with an aperture 13 through which gas that issues from the burner valve 3 and flows through the tube 9 passes to atmosphere. This aperture, when the gas is ignited, serves to locate a stable flame. The cover plate 12 is hinged about a fulcrum pin 14 to facilitate maintenance of the ignition mechanism.

A container 15 for the secondary fuel is located to one side of the tube 9. Secondary fuel from the container 15 issues from an orifice located centrally of the end 16 of the container which is close to the cover plate 12. The central location of the aperture causes the fuel to be projected along a path which is parallel, at least for a short distance, with the axis of the tube 9.

In accordance with the present invention the inner face 20 of the cover plate 12 is shaped in the vicinity of the orifice of the container 15 and the open end of tube 9 so as to provide inclined surfaces 18 and 19 which deflect respectively fuel from the container 15 and the main fuel issuing from the tube 9. As can be seen in Figure 1 the axis along which the stream of secondary fuel is directed intersects the inclined surface 18 while the corresponding axis for the main fuel passes through the aperture 13 adjacent that edge having the inclined surface 19. As best seen in Figure 3 these inclined surfaces are formed as part conical depressions formed in the inner face 20 of the cover plate 12 and with the respective conical axes extending through the aperture 13 adjacent an edge thereof and normal to the general plane of the cover plate 12. Surrounding the depression 18 is a recess 21 which serves to locate the end 16 of the container 15. The point of convergence of the deflected fuel streams is preferably arranged in the aperture and close to the outer surface of the cover plate 12 where, upon ignition, the flame will be stabilised. This ensures that an adequate supply of air is available to encourage and sustain ignition of the main fuel. This is important because the pyrophoric secondary fuel is expensive and only a small quantity is used to initiate combustion but not to sustain it subsequently.

The mechanism causing fuel to issue from the container 15 may be contained within the container itself although it is linked so as to be operated shortly after the burner valve has been opened by operation of the control member 5.

In operation the control member 15 is moved downwardly to lift the end of the fork lift member 11 and allow gas from the main fuel container 4 to issue from the tube 9 and through the aperture 13 and shortly thereafter the mechanism for causing fuel to issue from container 15 is operated. This mechanism is such that it is only operated very briefly to project a very small quantity of the secondary fuel which fuel is deflected by the surface 18 into the path of the main fuel as deflected by the other surface 19.

The secondary fuel, if pyrophoric, ignites instantaneously on contact with air so that the secondary fuel is aflame when it is projected into the main fuel stream to cause the latter to ignite and form a flame located at the aperture.

The dishing of the outer face of the cover plate 12 and the consequent reduction of thickness at the aperture 13 ensures that the point of convergence of the fuels and hence the point of ignition is close to or actually in the air outside of the lighter.

Figure 4 shows an alternative arrangement of which only part of the lighter is shown. The reference numerals used in Figures 1, 2 and 3 will be used to indicate corresponding parts in Figure 4. The end of the tube 9 is shown adjacent to the seoondary fuel container 15. In this Figure the cover plate 12 is shown to be made up from sheet metal with two lugs which are bent inwardly to form the inclined surfaces 18 and 19. In the embodiment of Figures 1, 2 and 3 the cover plate 12 is solid metal, conveniently a casting. Again the inclined surfaces 18 and 19 serve to cause the fuel from the container 15 and the fuel issuing from the end tube 9 to converge whereby the main fuel is ignited.

WHAT WE CLAIM IS:—

1. A smokers' lighter of the kind in which a secondary fuel is used to ignite a main fuel and the lighter has a cover plate which is formed with an aperture through which at least the main fuel passes to atmosphere, the aperture serving to locate, upon ignition of the main fuel, a stable flame, wherein the main and secondary fuels issuing as streams from respective containers are directed towards the inner face of the cover plate along substantially parallel axes and the said inner face is shaped to cause the fuel stream to converge in the vicinity of the aperture.

2. A smokers' lighter as claimed in Claim 1 wherein the fuel streams converge outside the aperture.

3. A smokers' lighter as claimed in Claim 1 or Claim 2 wherein the axis along which the stream of secondary fuel is directed intersects an inclined surface formed on the cover plate whereby the fuel is deflected towards the aperture.

4. A smokers' lighter as claimed in any preceding claim wherein the axis along which the stream of main fuel is directed passes through the aperture adjacent an edge thereof and the adjacent part of the

A cover plate 12 which provides a decorative outer surface is formed with an aperture 13 through which gas that issues from the burner valve 3 and flows through the tube 9 passes to atmosphere. This aperture, when the gas is ignited, serves to locate a stable flame. The cover plate 12 is hinged about a fulcrum pin 14 to facilitate maintenance of the ignition mechanism.

A container 15 for the secondary fuel is located to one side of the tube 9. Secondary fuel from the container 15 issues from an orifice located centrally of the end 16 of the container which is close to the cover plate 12. The central location of the aperture causes the fuel to be projected along a path which is parallel, at least for a short distance, with the axis of the tube 9.

In accordance with the present invention the inner face 20 of the cover plate 12 is shaped in the vicinity of the orifice of the container 15 and the open end of tube 9 so as to provide inclined surfaces 18 and 19 which deflect respectively fuel from the container 15 and the main fuel issuing from the tube 9. As can be seen in Figure 1 the axis along which the stream of secondary fuel is directed intersects the inclined surface 18 while the corresponding axis for the main fuel passes through the aperture 13 adjacent that edge having the inclined surface 19. As best seen in Figure 3 these inclined surfaces are formed as part conical depressions formed in the inner face 20 of the cover plate 12 and with the respective conical axes extending through the aperture 13 adjacent an edge thereof and normal to the general plane of the cover plate 12. Surrounding the depression 18 is a recess 21 which serves to locate the end 16 of the container 15. The point of convergence of the deflected fuel streams is preferably arranged in the aperture and close to the outer surface of the cover plate 12 where, upon ignition, the flame will be stabilised. This ensures that an adequate supply of air is available to encourage and sustain ignition of the main fuel. This is important because the pyrophoric secondary fuel is expensive and only a small quantity is used to initiate combustion but not to sustain it subsequently.

The mechanism causing fuel to issue from the container 15 may be contained within the container itself although it is linked so as to be operated shortly after the burner valve has been opened by operation of the control member 5.

In operation the control member 15 is moved downwardly to lift the end of the fork lift member 11 and allow gas from the main fuel container 4 to issue from the tube 9 and through the aperture 13 and shortly thereafter the mechanism for causing fuel to issue from container 15 is operated. This mechanism is such that it is only operated very briefly to project a very small quantity of the secondary fuel which fuel is deflected by the surface 18 into the path of the main fuel as deflected by the other surface 19.

The secondary fuel, if pyrophoric, ignites instantaneously on contact with air so that the secondary fuel is aflame when it is projected into the main fuel stream to cause the latter to ignite and form a flame located at the aperture.

The dishing of the outer face of the cover plate 12 and the consequent reduction of thickness at the aperture 13 ensures that the point of convergence of the fuels and hence the point of ignition is close to or actually in the air outside of the lighter.

Figure 4 shows an alternative arrangement of which only part of the lighter is shown. The reference numerals used in Figures 1, 2 and 3 will be used to indicate corresponding parts in Figure 4. The end of the tube 9 is shown adjacent to the secondary fuel container 15. In this Figure the cover plate 12 is shown to be made up from sheet metal with two lugs which are bent inwardly to form the inclined surfaces 18 and 19. In the embodiment of Figures 1, 2 and 3 the cover plate 12 is solid metal, conveniently a casting. Again the inclined surfaces 18 and 19 serve to cause the fuel from the container 15 and the fuel issuing from the end tube 9 to converge whereby the main fuel is ignited.

WHAT WE CLAIM IS:—

1. A smokers' lighter of the kind in which a secondary fuel is used to ignite a main fuel and the lighter has a cover plate which is formed with an aperture through which at least the main fuel passes to atmosphere, the aperture serving to locate, upon ignition of the main fuel, a stable flame, wherein the main and secondary fuels issuing as streams from respective containers are directed towards the inner face of the cover plate along substantially parallel axes and the said inner face is shaped to cause the fuel stream to converge in the vicinity of the aperture.

2. A smokers' lighter as claimed in Claim 1 wherein the fuel streams converge outside the aperture.

3. A smokers' lighter as claimed in Claim 1 or Claim 2 wherein the axis along which the stream of secondary fuel is directed intersects an inclined surface formed on the cover plate whereby the fuel is deflected towards the aperture.

4. A smokers' lighter as claimed in any preceding claim wherein the axis along which the stream of main fuel is directed passes through the aperture adjacent an edge thereof and the adjacent part of the

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cover plate is formed with an inclined surface which acts to deflect at least part of the stream into the aperture.

5. A smokers' lighter as claimed in Claim 3 or Claim 4 in which the or each inclined surface is formed as a part conical depression in the inner face of the cover plate, the conical axis of the or each depression extending through the aperture.

6. A smokers' lighter as claimed in Claim 3 or Claim 4 in which the cover plate is formed from sheet metal with lugs which are bent inwardly to form the inclined surfaces.

7. A smokers' lighter as claimed in any preceding claim in which the outer face of the cover plate is dished.

8. A smokers' lighter as claimed in any preceding claim in which the fuel containers are arranged end to end with the container for secondary fuel positioned nearer the cover plate, and fuel from the main fuel container is fed to a point adjacent the aperture by means of a tube.

9. A smokers' lighter of the kind in which a secondary fuel is used to ignite a main fuel, substantially as herein described with reference to the accompany drawings.

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