PATENT SPECIFICATION

619,737

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Index at acceptance:—**Class 75(iii),** F9b.

COMPLETE SPECIFICATION

Improvements in Jet Lighters

We, BEATTIE PRODUCTS, INC., a Corporation of the State of New York, United States of America, of 17, East 48th Street, New York, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to pocket lighters of the kind in which a vaporising chamber to which fuel is led by a jet wick is formed with a small orifice for the emission of vapour from the said chamber, and an ordinary wick, adapted to be ignited in the usual manner by sparks from a flint, provides, when ignited, a flame which plays upon the vaporising chamber to vaporise the fuel therein and to ignite the jet of vapour flowing from the orifice, thus providing a jet of flame.

Previously proposed pocket lighters of this kind have operated effectively in most respects. They have, however, been subject to annoying limitations which have tended to affect their saleability and their reputation when once sold and put into use.

In particular, on prior type of jet lighter overlooked the fact that the vapour pressure built up to provide the jet, caused a substantial back pressure through the jet wick. ~~The~~ pressure would build up in the fuel compartment and tend to force liquid fuel out through the ordinary wick. Among the methods proposed to overcome this, one called for making the lighter housing of telescoped shells leaving space for fuel expansion. This was cumbersome, uneconomical, and did not preclude leakage out between the shells, should the lighter be upside down in one's pocket, or due to pressure within. Another proposal called for partially plugging the inner end of the tube carrying the jet wick to introduce resistance to back pressure down the jet tube. This worked well for lighters in substantially continuous use, but it did restrict the capillary action of the wick somewhat, with the result that a new lighter taken from the shelf in a store would require some time for its jet wick to carry liquid up to the jet compartment after the first filling to produce flame. The effect of this delay on prospective customers can be readily appreciated.

Another feature of prior lighters which calls for improvement is the maintenance of a proper jet aperture. These apertures are minute and, for proper operation, should remain so. They do, however, clog up occasionally, and if the user of the lighter attempts to open one of them up, he might well overdo it and enlarge the aperture to such an extent that the jet flame will not operate.

The main object of the present invention is to provide a lighter of the kind referred to in which the transference of pressure to the fuel compartment is prevented without introducing the attendant disadvantages set out above. Another object is to avoid the necessity for cleaning out a clogged jet orifice.

According to the invention, in a lighter of the kind referred to, the jet wick and the ordinary wick of which both receive fuel from a common fuel compartment, the jet wick is mounted in an elongated jet tube leading from the vaporising chamber to the fuel compartment and co-operates with said tube to resist the transfer to the fuel compartment of pressure built up in the vaporising chamber.

The jet orifice may be formed in a member having a hand-tight fit on the end of the jet tube.

The present invention provides a way of preventing the back pressure from working down through the wick into the fuel compartment, and to accomplish that end without introducing any undesirable effects. This we do by fitting the

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jet wick snugly within its tube, furnishing that tube with moderately sharp bends without restricting its interior path, and making the tube of sufficient length so that the resistance built up is just equal to or slightly in excess of the pressure generated in the jet chamber. This improvement not only eliminates the necessity of having an expansible main fuel compartment, but also eliminates the necessity of partially plugging the inner end of the jet tube. Lighters made according to our invention, when first filled with lighter fluid, will operate wick and jet almost instantaneously. In addition, a positive closure can be provided for the bottom of the lighter so as to eliminate the possibility of leakage inherent in the telescoping shell arrangement. Furthermore, the bottom closure can be so constructed and gasketed that instead of removing it once it is properly seated, one merely needs to remove the securing screw to fill through the screw hole without disturbing the bottom closure itself.

To assure the maintenance of a proper jet aperture, we form the aperture in the end of a minute thimble. Such thimble and the end of the jet tube are constructed so as to be readily assembled and disassembled by hand. By furnishing a reasonable supply of replacement thimbles with each lighter sold, the user thereof may simply and properly apply a new jet aperture should the one he is using become clogged.

In the accompanying drawing:

Figure 1 is an elevation to a small scale of the type of lighter with which the invention is concerned;

Figure 2 is a vertical section of the lighter of our invention shown in open or operative position;

Figure 3 is a plan view of the bottom of the lighter showing the improved bottom closure employed;

Figure 4 is a fragmentary section taken on lines 4 of Figure 3, showing the securing screw for the bottom closure for filling through its opening.

Figure 5 is a detailed elevation showing our jet tube removed from the lighter.

Figure 6 is an enlarged fragmentary section showing the removable thimble carrying the jet aperture and the mounting therefor.

Figure 7 is a perspective view of the web for receiving the securing screw for the bottom closure.

The lighter of the invention comprises a body portion generally indicated at 5. This portion has a continuous side wall 6 of desired shape and a closed top 7. This top is provided with suitable apertures and fittings 8, 9 and 10 for the extension therethrough of a jet tube 11, an ordinary wick 12, and the striking flints 13. In addition, it has affixed to it a guard member generally shown at 14 carrying the cover 15, pivoted against the action of the spring toggle 16. This cover also carries a snuffer 17 for the wick of the main burner. In addition, the guard 14 is furnished with a mounting 18 for the pivotal reception of the striking wheel 19, all of which parts are common to lighters of this type and form no particular part of this invention.

The jet tube 11 differs in extent and direction from any heretofore proposed. Inside of the main fuel compartment or body of the lighter, this tube 11 extends down close to the bottom thereof and is then turned sharply laterally in a right angle bend 20. From the point 20, it extends well across the compartment to another right angle bend 21, and thence upward to terminate in the curved portion 22. These bends 20 and 21, though shown as substantially right angle ones, may be varied somewhat as to angularity, depending on such factors as the length of tube 11, and the fit of a jet wick 23. This wick is seated snugly within the tube 11 and extends out freely at 24 from the unrestricted inner end 25 of the tube 11, so that it may readily pick up fluid from the main fluid compartment.

The tube 11 extends exteriorly of the wall 7 into a smooth bend 26, and from thence substantially horizontally, to terminate in a slightly tapered outer end 27. This end 27, as best shown in Figure 6, is fitted with a thimble 28, whose side wall 29 is tapered in accordance with the taper of the end 27, and whose end wall is perforated at 30 to form the minute jet orifice.

The tapers 27 and 29 are so related that the thimble 28 may be installed and removed by hand without any great effort, but will hold together unless intentionally separated. This enables the user of the lighter, on the clogging of the orifice 30, to remove the thimble 28, and replace it with a new one, several of which we contemplate providing with each lighter.

The provision of this easily removable thimble as already pointed out, eliminates a cause of annoyance in prior art constructions. In order for the jet flame to operate effectively, the orifice 30 must be very minute and not vary too much from the exact dimension selected for it. The orifice is so minute, however, that should it become obstructed, the user may have difficulty in locating

the place where it is supposed to be. If he does locate it, he is not likely to have available any instrument small enough to clean out the orifice without enlarging it. Any enlargement of the orifice will at least reduce the effectiveness of the jet if it does not entirely destroy its operation, so the provision for replaceable thimbles carrying proper orifices is a considerable advantage. Without them the lighter might have to be returned to the factory for repairs.

Returning to the tube 11 and its wick 23, it is to be noted that said wick, though extending outward of the main fuel compartment, does not extend to the outer end of the tube 11, but terminates at the position shown at 31, sufficiently inward of the outer end of the tube 11 to provide for a gas chamber 32 between the end 31 of the wick and the end of the thimble 28. Assuming for the moment that the main fuel compartment is filled, and the wicks 23 and 12 are properly supplied with fuel, the outer end 33 of the wick 12 may be lighted by spinning the wheel 19 in conventional fashion. Should it then be desired to light a pipe or anything else for which a projected jet flame would be desirable, the lighter is tilted so that the flame from the end 33 impinges on the thimble 28 and the end 27 of the tube 11 containing the gas chamber 32. The heat from the flame will then vaporize the fluid from the end 31 of the wick 23 and build up sufficient pressure in such vapour to cause it to force a fine stream out through the opening 30. This vapour stream will, of course, be ignited by the flame from the wick 12, will extend a substantial distance from the orifice 30, and will continue to burn for a sufficient length of time to enable a leisurely lighting of a pipe. It is, of course, necessary for proper operation, that a fairly substantial pressure be built up in the gas chamber 32. On the other hand however, the pressure is insufficient to overcome the fit of the taper portions 27 and 29 so is released quite slowly through the minute orifice 30. The pressure will thus attempt to escape in any other direction available. The only other possible path is back through the wick 23, and that is where it attempts to go. If it be permitted, however, to back up into the main fuel compartment, that compartment will shortly be under an internal pressure greater than the external pressure of the atmosphere, and leakage of the liquid fuel will result, particularly through the wick 12. If, on the other hand, the tube 11 be constricted in order to resist the back pressure from the wick 23, such constriction will act to materially reduce the capillary action of the wick 23, resulting in the undesirable effects already discussed.

We have found that by selecting a wick of proper texture which will have the proper snug fit within the jet tube, a definite length of tube is required to provide the proper resistance to back pressure. Taking, as an example, a tube whose internal diameter is 3/32" and drawing thereinto a wick of a hard finish braid, also having a diameter of 3/32", we find that the pressure exerted by the jet is equalized in a tube length of 3 5/16". It is not too difficult to draw such a diameter wick into such a diameter tube, and it results in what we term a snug fit. By using a slightly larger wick, we find that the tube length can be decreased somewhat, though counterbalancing this is the fact that such a wick is difficult to draw into the tube. Other dimensions capable of giving good performance can, of course, be determined by following the teaching of the invention, so it is to be understood that the example given hereinabove is merely illustrative and is not to be considered in a limiting sense.

The bends 20, 21 and 22 are placed in the tube merely to accommodate its length in the size casing employed. So long as they are smooth and do not constrict the course of the snugly fitted wick 23, they make no material difference in the operation of the jet.

The elimination of back pressure in the main fuel compartment enables us to provide a positive fuel-tight closure for the bottom of that compartment rather than one of the prior art type which allowed for expansion as such pressure built up. We accordingly furnish a closure plate 33 having an edge flange 34 therearound to snugly fit the exterior surface 6 of the chamber 5. A gasket 35 of a packing material, impervious to the common forms of liquid fuel employed, is fitted within the confines of the closure 33 and its edge flange 34. In addition, the closure 33 is provided substantially centrally thereof with a depression 36 for the reception of a securing or filling screw 37. The screw 37, as best shown in Figure 2, has as one of its principal functions the securing of the closure 33 in position to assure a leakproof joint between 33 and the body 6 by the intermediation of the gasket 35. If this leakproof seal is maintained for any period of time, however, the closure 33 will quite likely stay in place, even though the screw 37 be removed. We thus contemplate that the refilling of the

lighter can be provided for merely by the removal of the screw 37. By taking that screw all the way out, then a clear passage will be present from the interior of the container through the closure 33, the gasket 35, and the screw threaded opening 38 in the web 39 which extends across the bottom of the body 5 to receive the screw 37. An ample aperture is thus provided for the filling of the main fuel compartment, and if the lighter be held upside down while this is being done, it it is not even necessary to employ the type of can which squirts the fuel in, since the depression formed to take the screw head 37 will direct the liquid in the proper path. This latest feature of the invention simplifies the handling of these lighters to a marked degree, and gives the user a choice of either removing the entire bottom of the lighter or merely removing the combined securing and filling screw, if refilling is all that is desired.

It is believed that the foregoing adequately describes the purpose and operation of the various elements of our invention so that no further exposition of it is necessary.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A lighter of the kind referred to, the jet wick and the ordinary wick of which both receive fuel from a common fuel compartment, wherein the jet wick is mounted in an elongated jet tube leading from the vaporising chamber to the fuel compartment and co-operates with said tube to resist the transfer to the fuel compartment of pressure built up in the vaporising chamber.

2. A lighter according to claim 1, wherein the jet wick fits sufficiently tightly in the jet tube to prevent the vapour pressure in the vaporising chamber from reaching the fuel compartment, but is not sufficiently compressed to interfere with the capillary action of the said wick.

3. A lighter according to claim 1, wherein the jet wick fits snugly in the jet tube throughout the whole of their common length, so as to provide, in the length of said tube, sufficient resistance to pressure transference to prevent the pressure in the fuel compartment from rising due to the pressure generated in the vaporising chamber, without interfering with the capillary action of the said wick.

4. A lighter according to any preceding claim, wherein the external diameter of the jet wick is equal to the internal diameter of the jet tube.

5. A lighter according to any preceding claim, wherein the jet orifice is formed in a member having a hand-tight fit on the end of the jet tube.

6. A lighter according to any preceding claim, wherein the fuel compartment is closed at the bottom by a closure having securing means including a member which projects into the interior of the compartment, removal of said member providing a passage whereby fuel may be introduced into the compartment without removing the closure.

7. A lighter of the kind referred to, substantially as described with reference to, and as shown in, the accompanying drawings.

Dated this 23rd day of December, 1946.

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