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COMPLETE SPECIFICATION

Improvements in or relating to Pyrophoric Lighters

I, PAUL GRUNWALD, a German Citizen, sole Proprietor of the Firm PAUL GRUNWALD, METALLWARENFABRIK, of 15, Wusterhausenerstrasse, Berlin, SO 16, Germany, 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 an automatic pyrophoric lighter in which benzine or petrol is used as liquid fuel and which is divided in known manner, into a closed storage container for the benzine or the like, and a cotton wool impregnating chamber, from which a capillary wick leads to the point of ignition, and is kept moistened with fuel. In general, the cotton wool is impregnated manually, by pouring into it a small quantity of benzine, but, in some cases it has already been effected automatically by means of a pervious packing on the stopper which closes the feed opening of the benzine container and so disposed that the impregnating chamber adjoins the pervious packing.

Lighters are also known in which the saturation of the plugs of cotton-wool is effected by a second wick which leads direct from the impregnation chamber of the plug of cotton-wool into the fuel container.

In all these lighters, whatever the design, the fuel container is at the bottom and the cotton-wool impregnation chamber at the top directly beneath the platform carrying the ignition device and the flame site. The wall of the cotton-wool impregnation chamber are in consequence repeatedly heated, and thereby give rise to an undesirable rapid evaporation. The fuel container must be pushed in from below and must have gaps in order to leave space free for the inaccessibly located parts of the ignition device in the cotton-wool impregnation chamber (e.g. flint tube).

The present invention on the other hand, provides a pyrophoric lighter having a liquid fuel container and a cotton-wool impregnating chamber, in which said impregnating chamber is impregnated by a wick communicating with said fuel container and supplies a flame wick, said impregnating chamber being arranged below the fuel container when in the operative condition.

This arrangement substantially simplifies the design, inasmuch as the fuel container at the upper end carries, on its top, the ignition device, and an outer casing, open only at the top, is slipped over the container from below, in such a manner that the lower part of said casing is left free to serve as the impregnating chamber. By this means the impregnating chamber is protected from being heated by the flame.

In this case the communication between the impregnating chamber and the seat of the flame, by means of a capillary wick, is established by means of a wick tube passing through the fuel container without coming into contact with the interior of the latter. This arrangement reliably prevents the flame from lighting back into the impregnating chamber, and also impedes any sudden discharge of accumulated gas from the impregnating chamber to the seat of the flame and the consequent formation of undesired spurts of flame. A further special advantage is afforded by the unrestricted access, not only to the upper end of the wick, at the seat of the flame, but also to its lower end, which, in all known lighters, is situated in a cavity that is difficult of access, if at all, so that, for the most part, the wick can be raised only from the charred upper end by means of a tool. The lighter of the present invention enables the wick to be conveniently raised by pushing the lower end, or drawing it from above, with the hand, and thus provides a long-desired easier method of adjusting the wick.

The pyrophoric lighter of the present invention can be provided with any known type of ignition device.

According to the invention moreover,

the benzine may be transferred from the container by placing the interior of the flame wick tube, which intersects the benzine container, in permanent communication with the interior of the said container. In this arrangement, the provision of a special capillary wick between the fuel container and the impregnating chamber is dispensed with. It has been found, by experiment, that a very small bore about 0.2 mm. in diameter, produces the special effect—as communicating means between the said two chambers—that the fuel passes from the container into the flame wick and the impregnating chamber connected therewith, only until the absorbent materials become saturated. Experience shows that this action saves a very considerable amount of fuel. Inasmuch as the opening of the very small bore into the interior of the flame wick tube is closed to some extent by the wick, the unexpected automatic starting and stopping of the transmisson of the fuel is apparently attributable, on the one hand, to diffusion and, on the other, to the occurrence of an osmotic pressure drop. The bore is preferably located directly above the bottom of the fuel container, though it may be situated in any other position. The other advantages peculiar to the arrangement described in the foregoing, in respect of the relative position of the fuel container and impregnating chamber, are fully retained in the modified construction of lighter.

In itself, it is known to provide a pervious packing, or a narrow bore, at the feed opening of the container, for the purpose of transmitting the fuel from the container to the impregnating chamber. Experience has shown, however, that these means do not produce the effect described above. Said effect is evidently dependent on the presence of the flame wick in the narrow guide tube, which latter, owing to the vicinity of the seat of the flame, quickly becomes warmed each time the lighter is used, and sets up the effective pressure difference for the resulting delivery of fuel.

In order more clearly to understand the invention, reference is made to the accompanying drawings, which illustrate diagrammatically and by way of example, two embodiments of automatic lighter in accordance therewith.

Referring to Fig. 1, the fuel container 11 is inserted into the outer casing 10, which is closed at the bottom and open at the top. Two tubes pass vertically through said container 11, from top to bottom, the one tube 12 serving to house the flint 19 and its spring, whilst the other tube 13, contains the actual flame wick 22. The two tubes are so constructed as not to obstruct the continuity of the cavity of the fuel container. The outer casing 10 extends slightly above the top of the fuel container 11 and is closed there by means of the cap 14, provided, on the inner side, with a latching hook 15 engaging under the horizontally pivotable locking nose 16 and thereby retaining the cap in the closed position against the pressure of a spring. The cap also carries the wickcap 17. On the other hand, the ignition wheel 18 and the rotatable nose 16 are mounted on the upper side of the fuel container 11.

The feed opening located on the underside of the container 11 is closed by the screw stopper 20, with interposed washer 24. The wick 21, which conveys the fuel, is passed through a central bore in said stopper 20 in such a manner that its upper end dips into the liquid 25, situated above in the container, whilst its lower portion is embedded in the cotton wool 23 contained in the free space between the underside of the container 11 and the bottom of the outer casing 10.

The lighter functions in the following manner:—

The wick 21 transmitting the fuel feeds the liquid 25 continuously into the impregnating chamber 23, so far as is permitted by the self-regulating moisture of the wick. The flame wick 22 takes up the fuel from the cottonwool 23 and delivers it to the point of ignition, where it is always ready to be ignited. Rotating the nose 16 releases the hook 15 and with it the cap 14, so that the latter can swing up towards the left, about the pivotal axis of the wheel 18, under the action of a spring thereby actuating the flint wheel 18 in a per se known manner. The sparks generated by the action of the friction wheel on the flint 19, are directed towards the upper end of the flame wick 22 and ignite the wick by the aid of the gasifying fuel. A simple pressure by the hand, on the open cap 14, shuts the lighter and, at the same time, extinguishes the flame by means of the wick cap 17.

Reference will now be made to Fig. 2, which shows the modified form of lighter in position for use, the flame wick being ignited and the wick cap 17 turned up. The outer casing 10 surrounds the fuel container 11. The cover of the container carries the flint tube 12, in front of the mouth of which is mounted the friction wheel 18. The wick cap 17 is retained, in the open and closed positions respectively, by the spring 15. The charging opening of the fuel container 11 is tightly closed by the screw 20 and packing 24. The impregnating chamber 23 is formed

by the space between the bottom of the outer casing 10 and the bottom of the fuel container 11.

Th flame wick 22 leads from the seat of the flame, through the narrow tube 13 and into the impregnating chamber 23. The tube 13 passes vertically through the fuel container 11, in exactly the same manner as in the lighter illustrated in Fig. 1, and is soldered to the top and bottom of the container. The bore 21 is provided in the wall of the tube 13, directly above the bottom of the fuel container 11.

The lighter illustrated in Fig. 2, functions in the following manner:

When the lighter is not being used, the small dimensions of the communicating bore 21 normally prevent any passage of liquid fuel from the container 11 so long as saturation pressure exists in the flame wick 22 and the adjacent impregnating chamber 23. On the wick cap 17 being raised, that is, turned up, and the friction wheel 18 actuated, the upper end of the flame wick 22 ignites and the saturation pressure prevailing in the wick disappears in consequence of the resulting heating effect. There ensues, accordingly, a relative positive pressure in the fuel container 11, which causes fuel to be delivered from the latter into the interior of the tube 13. This pressure overcomes the adhesion which the wall of the narrow bore 21 otherwise exerts on the liquid. The cross section of said bore is so arranged that, by also drawing on the degree of saturation of the flame wick in the impregnating chamber, the flame can keep on burning long enough for the ordinary functioning of the lighter. After the wick cap has been let down and the flame extinguished, the delivery of fuel continues until the whole length of the wick 22 has regained its normal degree of saturation, and the saturation pressure in this zone corresponds to that of the liquid in the fuel container 11. The delivery then ceases automatically. The experiments made with a lighter of this kind have shown that there is practically no wasteful evaporation of fuel. The observed economy of fuel could not hitherto be attained in the case of other types of lighters.

Naturally, the economical transmission of the fuel from the container to the flame wick depends, more or less, on the exact retention of the tested diameter of the bore 21. According to the invention, since a certain tolerance is desirable, to facilitate mass production, a narrow tube 19—indicated by dot-and-dash lines in the drawing—disposed transversely to the wick tube, may be provided round the bore. By varying the length of this tube 19, an adaptation to the ascertained delivery capacity of fuel from the container to the wick, in the case of the type of lighter concerned, can be conveniently obtained. Such possibility of adaptation is particularly valuable when lighters with tanks—and therefore wick tubes 13—of different lengths are being produced at one and the same time.

The wick tube 13 need not necessarily be mounted in the middle (or centre) of the horizontal cross-section of the fuel tank 11, but may be arranged adjacent the left- or right-hand side-wall of the fuel tank 11.

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

1). A pyrophoric lighter having a liquid fuel container and a cotton wool impregnating chamber, in which said impregnating chamber is impregnated by a wick communicating with said fuel container and supplies a flame wick, said impregnating chamber being arranged below the fuel container when in the operative condition.

2). Lighter as claimed in claim 1, in which the flame wick projects through the top wall (lid) of the fuel container, where is situated the seat of the flame.

3). Lighter as claimed in claims 1 and 2, in which the flame wick is contained in a closed tube passing transversely through the fuel container from the top wall to the lower wall thereof, where it opens into the cotton-wool impregnating chamber.

4). Lighter as claimed in claims 1 to 3, in which the bottom portion of the casing forms the cotton-wool impregnating chamber, which is closed at the top by the base of the fuel container inserted into the casing from above.

5). Lighter as claimed in claims 1 to 4, in which the ignition device is also situated on the top wall (lid) of the fuel container, and is continued in the form of a tube guiding the flint spring, through the fuel container to the bottom. and is there accessible.

6). Lighter as claimed in claims 1 to 4, which is provided with an opening in the wall of the closed flame wick tube, whereby direct communication is established between the interior of the flame wick tube and the interior of the fuel container.

7). Lighter as claimed in claim 6, in which the communication bore opens at the bottom of the fuel container.

8). Lighter as claimed in claims 6 and

7, in which the communication bore is so small in diameter that the fuel in the fuel container cannot overcome the adhesion resistance opposed to its passage, so long as—in consequence of the saturation of the flame wick—no osmotic pressure difference exists between the interior of the wick tube and the fuel container.

9). Lighter according to claims 6 to 8, in which a correspondingly narrow tube establishing the communication with the fuel container, adjoins the bore.

10). The improved pyrophoric lighters, constructed, arranged and adapted to operate substantially as described with reference to the accompanying drawings.

Dated this 18th day of February, 1936.

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Fig. 1

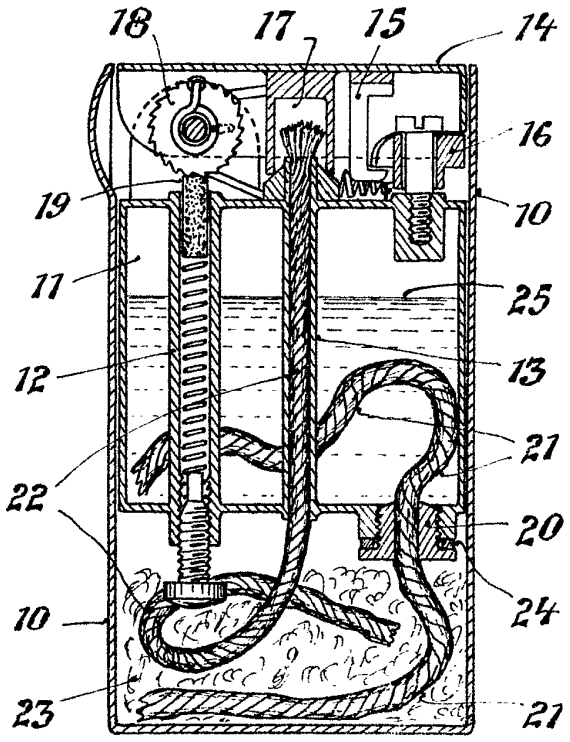
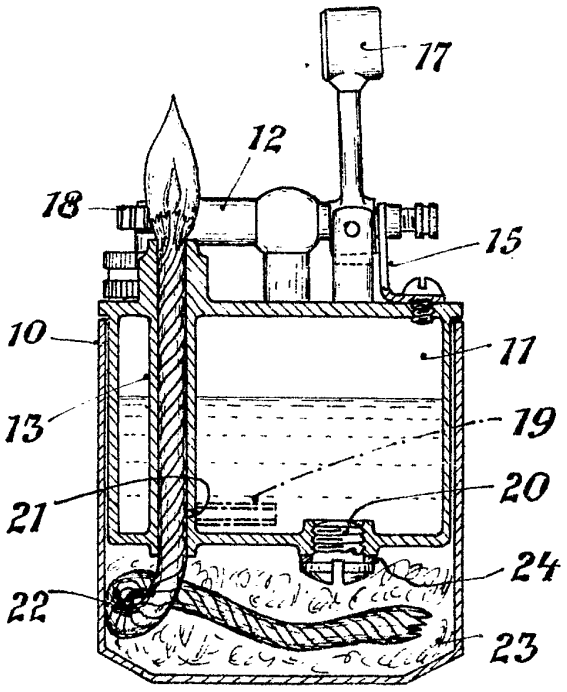


Fig. 2



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