

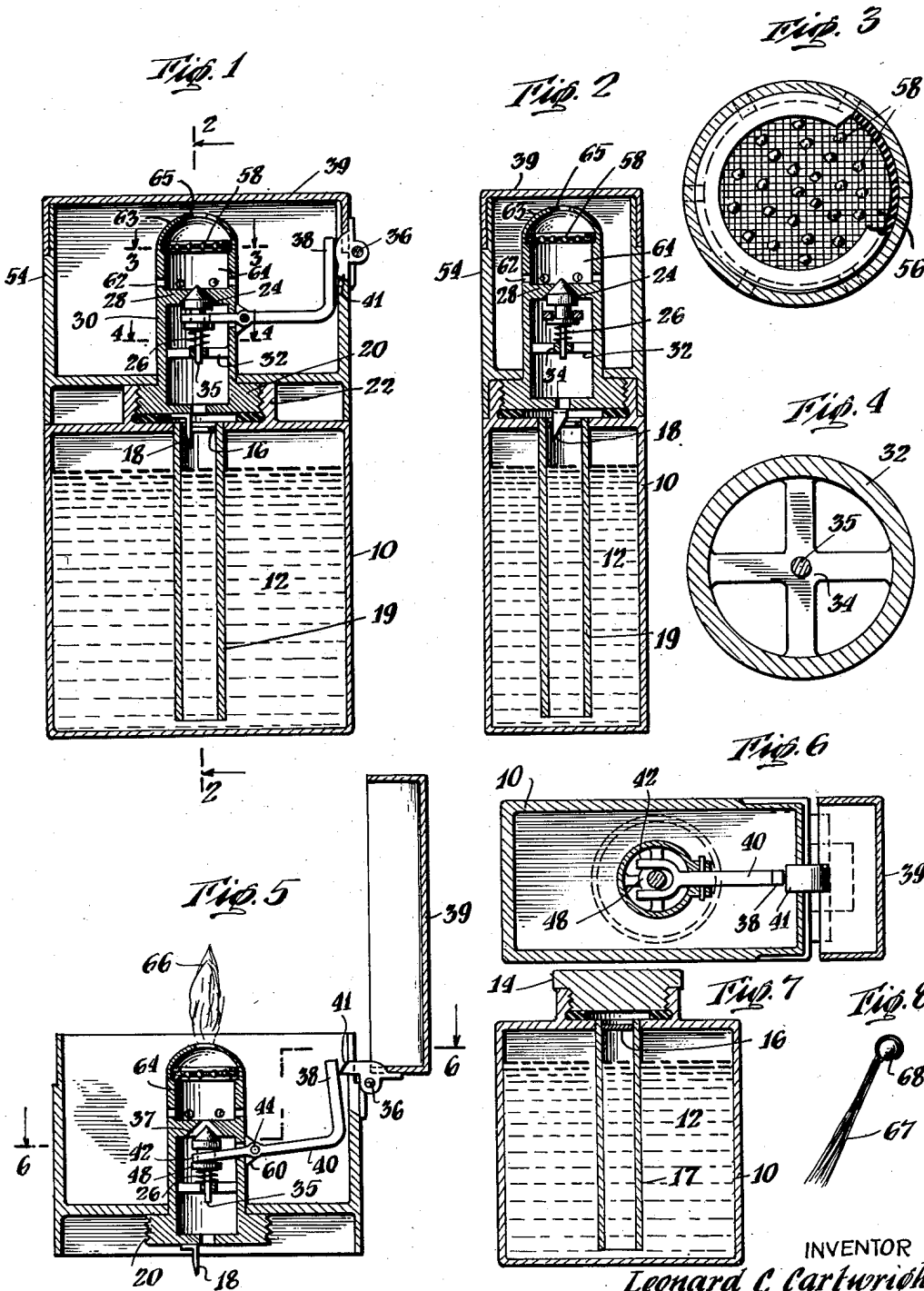
Nov. 29, 1949

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2,489,620

LIGHTER

Filed Feb. 9, 1946



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UNITED STATES PATENT OFFICE

2,489,620

LIGHTER

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Application February 9, 1946, Serial No. 646,671

1 Claim. (Cl. 67—7)

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This invention relates to apparatus and method for igniting an inflammable mixture of gases. The invention is particularly useful in providing an improved, dependable lighter for cigarettes and will be illustrated first, therefore, by description in connection with such a lighter.

My lighter requires no wick. It requires no spark.

The invention has for an object the provision of a lighter utilizing a vapor fuel under pressure above atmospheric.

The invention comprises a lighter for cigarettes or the like with a container for liquefied fuel of vapor pressure above atmospheric at room temperatures, a valve for releasing the fuel in the form of vapor as needed, and means operated by raising the closure cap for opening the valve, the valve being so arranged that the vapor pressure of the fuel promotes tight closing of the valve when the lighter is not in use.

The invention will be further illustrated by description in connection with the attached drawing to which reference is made.

Fig. 1 is a side sectional view of a cigarette lighter constructed in accordance with the invention.

Fig. 2 is a sectional view on line 2—2 of Fig. 1.

Fig. 3 is a plan view partly in section of the lighter member proper and mounting, this view being on line 3—3 of Fig. 1.

Fig. 4 is a view on line 4—4 of Fig. 1.

Fig. 5 is a side view, partly in section, of the top part of the lighter of Fig. 1 with the closure cap in open position.

Fig. 6 is a sectional view on the broken line 6—6 of Fig. 5.

Fig. 7 is a side sectional view of a fuel container suitable for use in conjunction with the lighter head of Fig. 1.

Fig. 8 is a plan view of a modified form of lighter element.

Parts or features not illustrated in detail are conventional.

There is shown in Fig. 7 a container or cartridge 10 for the fuel 12 as supplied, which is suitably in the form of a liquid of boiling point below normal atmospheric or room temperature, and a cap 14 which closes the container during shipment or storage. There is shown also a thin seal 16 for the fuel container and tube 17 depending from the top thereof.

In the assembly of Fig. 1, this container is shown with the cap removed, the container secured to the head of the lighter, and the seal 16 perforated by the knife 18.

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The lighter head of the assembly of Figs. 1, 2, and 5 includes the threaded generally cylindrical part 20 which engages by means of threads the top of the fuel container and which carries a pointed knife 18. As the engagement of the parts 20 and 22 is effected, the knife first perforates the sealing membrane 16 and then in revolving cuts a hole in the membrane.

The head proper of the lighter includes the valve 24 pressed by spring 26 upwardly against the valve seat in the sheet 28.

The valve and the said sheet 28 are disposed within the upstanding tubular connection member 30 through which the gas from the fuel cartridge passes upwardly to the ignition element. This sheet 28 serves in effect as a barrier between the fuel in the tank 10 and the mixing chamber 64. The sheet is provided with a tapered opening as shown which is normally closed by the valve 24 seated within the opening. When the valve is withdrawn from the opening then the mixing chamber is placed in direct communication with the fuel 12. Within the said tubular member there is disposed also the spider 32 (Fig. 4) provided with the central opening 34 serving as a guide for the stem of the valve 35 as illustrated in Fig. 5.

The lighter includes the closure cap 39 with hinge mounting 36 and means connecting the cap with the valve and serving when the cap is turned to the open position, to force the valve downwardly against the spring pressure and against the vapor pressure of fuel 12, so that the valve is opened. Opening the valve causes vapor from the fuel container to pass through the opening around the valve 24.

The means by which the cap, in opening, also opens the valve includes extension 41 of the hinged portion of the cap. As the cap is opened, this extension is caused to move inwardly and apply force to the lever arm 38 so as to raise part 40 of that arm and depress correspondingly the part 42, which extends beyond the pivot 44, and which has a generally fork like shaped end and engages the valve as drawn in Fig. 6.

Disposed below this fork like end 42 is washer 48 which is fixed to the stem 35 of the valve by conventional means (not shown) so that, as the fork is moved downward, the fork depresses washer 48 and thus lowers the valve so as to provide the opening shown at 37 in Fig. 5. More specifically, the valve opening member includes a generally L-shaped lever with horizontal leg 40 pivoted at position 44 to the tubular connection 30 and inner end 42 engaging the valve clos-

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ing member, the other leg 38 of the lever extending upwardly from the level of the horizontal leg and alongside the position of mounting of the cap upon the container. Opening of the cap causes the vertical leg to be moved inwardly as illustrated in Fig. 5 with a corresponding depression of the valve closing member away from the valve seat, so as to cause escape of vapor of the fuel from the fuel storage space.

When, on the other hand, the cap 34 is returned to the closed position shown in Fig. 1, the cap not only forms a good closure with the part 54 of the case of the lighter but also releases the pressure on the lever 38 so that the valve 24 returns to the closed position shown in Figs. 1 and 2.

In a preferred embodiment of the invention, the compact platinum is in the form of wire woven into gauze 56, suitably two of the gauzes closely spaced from each other, with granules of platinum black 58 held firmly between them.

In the upright tubular member 30 there is an opening adjacent to the hinged portion of the arm having parts 40 and 42, for movement of the part 42 as the valve is opened and closed. This opening is closed by the flexible seal 60 of conventional type secured in gas tight manner at one end around part 40 and the other to part 30 as shown.

Part 30 is provided also with air ports 62 for admitting the oxygen containing gas to a mixing chamber 64 directly above the valve 24, the opening of the valve when the cap 39 is opened causing a stream of the fuel gas to issue upwardly and cause an induced current of air to move through the ports 62 and into the mixing chamber. The extension of tube 30 above these ports provides a mixing chamber of volume adequate for thorough mixing of the air and combustible gas before the mixture strikes the ignition element including platinum wire and the platinum black 58.

The part 30 suitably extends above the lighter element proper as in form of the dome 63 with an opening 65 in the top. Through this opening there emerges the flame 66 of the burning mixture of gases. The flame is of convenient size for lighting cigarettes.

A modification of the ignition element shown in Fig. 8 includes a bundle of loosely assembled platinum wires 67 and a granule of platinum black 68 supported at the end of the bundle by twisting some or all of the wires around the granule. This ignition element may be substituted in the assembly of Figs. 1, 2 and 5, for the ignition element shown in detail in Fig. 3, the mounting of the lighter of Fig. 8 in the assembly with the other parts of the lighter being conventional and the granule 68 being so disposed as to contact the stream of gas rising through the upper part of member 30 when the lighter is in use.

The operation of the lighter will be largely evident from the description that has been given.

As a fuel, there is used to advantage a hydrocarbon that is easily condensed to liquid under moderate pressure but that has a boiling point at atmospheric pressure below the lowest temperature at which the lighter is used, normally room temperature. There may be used to advantage ethane, propane, or butane condensed as the liquid 12. Ethane, however, gives an unnecessarily high vapor pressure and requires undesirably strong construction to retain the ethane in liquid form. Butane has a boiling point that

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is not below temperatures at which a lighter may be used in severe winter weather. Propane is, therefore, preferred as the fuel. Alcohol or ether may be used provided the fuel container is warmed before use to a temperature above the boiling point of the selected fuel.

After removing the cap 14 from the container, the container is screwed upon nipple 20 of the head of the lighter. During this operation bringing the parts together causes knife 18 to penetrate and the subsequent rotation causes the knife to cut the membrane 16, so as to place the surface of the fuel in direct communication with the tube leading to the mixing chamber and then to the ignition element.

The tube 17 decreases spilling of the liquid 12 into the upper part of the lighter in case the lighter is tipped.

When valve 24 is in the normal or closed position, the vapor pressure of the fuel 12 acts upon the valve 24 so as to increase the closing pressure which improves sealing of the valve against the member 28.

When the cap of the lighter is opened, at the time of use, then the valve 24 is depressed against the pressure of the spring 26 and also against the vapor pressure of the liquid 12. This allows the liquid 12 to boil and the resulting gas to rise through the spider 32, through the valve opening, and into the mixing chamber 64, the escape of the gas through the opening 37 around the valve giving an aspirator effect and drawing air through the ports 62 disposed above the valve assembly. The result is formation in chamber 64 of a mixture of air and the combustible gas in the form of an upwardly moving stream. This stream passes over the ignition member including the granules 58 of platinum black.

When the mixture strikes the granules 58, the granules begin to glow at once. The glowing spreads rapidly from them to the adjacent platinum wire. This gives a very hot surface for the ignition of the gas mixture. This whole series of changes is completed in a matter of seconds.

The materials of construction may be those which are conventionally used in apparatus of this type. The various parts, unless otherwise specified, may be made of light sheeting, rods or tubes, as required to fit the drawing, of aluminum, stainless steel, brass or the like, chromium plated thin sheet steel being preferred for the exterior parts of the apparatus.

The diaphragm 16, which is used as a seal against escape of the fuel 12 before the fuel capsule is attached to the lighter head, is suitably of thin metal such as zinc, tin, or lead, the particular metal selected being preferably so soft as to facilitate puncturing by the point of the knife 18 and subsequent cutting with the knife during the screwing together of the lighter head and the fuel container, to give the assembly shown in Figs. 1, 2 and 5.

The platinum used in compact form is suitably fine wire, as for instance, 0.001 to 0.010 inch and preferably about 0.005 in. diameter.

The holding together of parts not shown in detail is effected by conventional means. Holding of the membrane 16 at its edges within the tube 19 is effected, for instance, by solder (not shown) and securing the tube 19 at its upper end (as in Fig. 7) within the top part of the fuel container by welding or brazing (not shown).

As the oxygen containing gas used for mixing with the combustible gas, air of course is the one which is normally employed. There is no point

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to using oxygen in place of air, although oxygen may be used if that is the gas which is normally mixed with the fuel to be ignited in any particular operation. The ignition element of Figs. 3 or 8 may be equipped with a usual type of handle and mounting (not shown) and used for lighting illuminating or heating gas mixed with air.

The platinum black that has been described is an example of the general class of catalytically active spongy platinum that may be used. The color of the spongy platinum is, of course, immaterial, the essential point being that the platinum used for the preliminary warming element be spongy and catalytically active, that is, active under the conditions of use in the ignition element so as to undergo warming when in contact with the combustible gas mixture.

The spongy platinum used may be purchased in prepared form. Commercial granules of platinum black are satisfactory.

The combination of the spongy platinum serving as the preliminary warming element and the platinum wire serving as the final ignition element may be depended upon to function regularly. When the stream of mixed gases contacts the combination, the warming initiated by the spongy platinum spreads quickly to the platinum wire and the mixture of the gases soon breaks into a flame providing the desired light for the cigarettes.

It will be understood that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purpose of illustration which do not constitute departures from the spirit and scope of the invention.

What I claim is:

A lighter for cigarettes including a container provided with a space for storage of liquid fuel

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of boiling point at atmospheric pressure below room temperature, a mixing space for vapor of the fuel and air, an openable closing cap for the container, a hinged mounting of the cap on the container, a barrier disposed between the storage space for the fuel and the said mixing chamber and provided with an opening in the form of a valve seat, a tubular connection between the storage space and the valve seat, a valve closing member extending into the said seat from the direction of the fuel storage space, so that the valve when forced in direction away from the said space closes the opening in the barrier, a generally L-shaped lever having a horizontal leg pivotally mounted on the tubular connection and at its inner end projecting beyond the position of mounting on the said connection and engaging the valve closing member and having a vertical leg extending upwardly from the level of the horizontal leg and to a position alongside the hinged mounting of the closing cap, and means operated by the cap for forcing the vertical leg of the lever inwardly when the cap is opened, this causing the valve closing member to be withdrawn from the valve seat.

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