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R. E. CHÉROUVRIER

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PYROPHORIC LIGHTER

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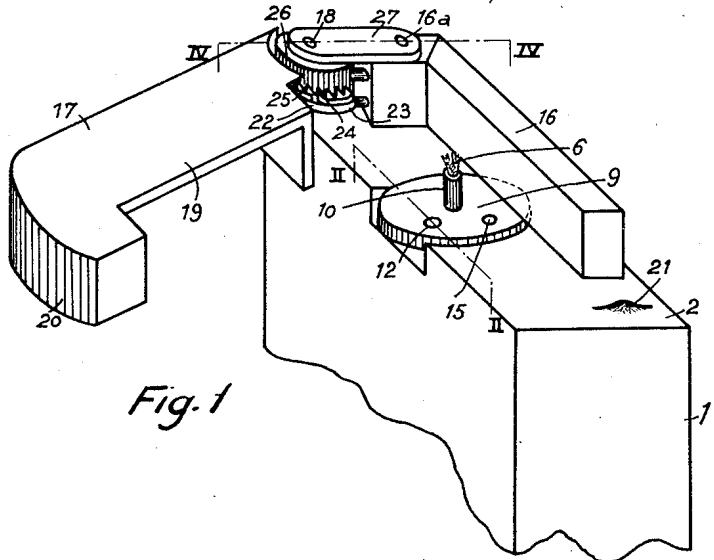


Fig. 1

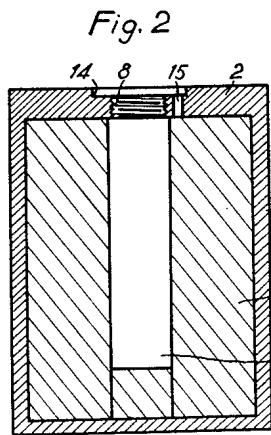


Fig. 2

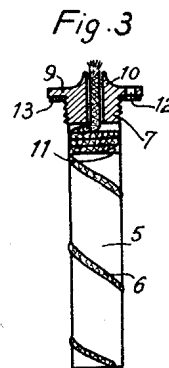


Fig. 3

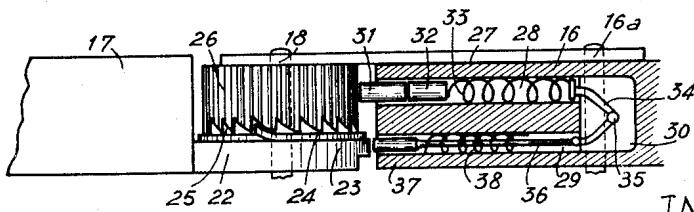


Fig. 4

INVENTOR

Robert Ernest Chérouvier  
By Robert E. Bieus  
ATTORNEY

# UNITED STATES PATENT OFFICE

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## PYROPHORIC LIGHTER

Robert Ernest Chérouvrier, Paris, France

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5 Claims. (Cl. 67—7.1)

1

This invention relates to pyrophoric lighters including a friction wheel cooperating with a flint for producing by rubbing the same a bunch of sparks capable of igniting the inflammable vapors evolved from a wick impregnated with a liquid fuel. The invention relates more particularly to lighters of this category belonging to the type wherein the friction wheel is automatically driven responsive to the opening of the lighter cover.

It is known that the mechanism of lighters of this type and the arrangement of their parts permit only with difficulty to interchange the wick and the flint. Furthermore the flint is generally applied constantly against the friction wheel which results in one end of the flint wearing away unevenly, so that the flint assumes a shape matching that of the friction wheel and the rubbing action of the latter soon becomes much less efficacious so that the operation of the lighter becomes unreliable.

It is also known that lighters of this type are generally filled through the bottom by means of an orifice which communicates with a container in which is placed cotton-wool or another absorbent material in contact with the tail portion of the wick, thereby forming two sources of evaporation for the fuel, namely one downwardly through the filling plug, and another one through the wick itself.

It is an object of the invention to provide an improved pyrophoric lighter remedying the aforesaid disadvantages and comprising a flint which is applied against the friction wheel only during the ignition stage and during the time which is necessary for the production of the bunch of sparks, the flint being so arranged as to remain accessible at all times for being changed without requiring the dismantling of any part.

Another object of the invention is to provide a lighter as aforesaid wherein the filling is effected through an orifice provided adjacent the wick and stopped, during the operation of the lighter, by a tight plug so that the wick remain the only source of evaporation of the fuel, the fuel vapors being also utilized for facilitating the ignition.

A further object of the invention is to provide a lighter as aforesaid comprising a container the upper wall of which carries all the igniting and filling parts, a rockable lever arm which may be controlled either automatically or manually being provided for causing the friction wheel to rotate owing to the interposition of a pawl-like washer or of a pawl connected to a lid-like lever arm

2

engaging a ratchet wheel which drives the friction wheel or owing to the interposition of another suitable member.

A still further object of the invention is to provide a lighter as aforesaid wherein the filling is ensured by means of a plug which provides communication between the container and the atmosphere, this plug also carrying a sleeve for the wick and being extended inside the container to form a body of absorbent material upon which is wound the wick, the latter being guided if necessary by a helical or other carcass, said body being arranged between masses of absorbent material distributed in the container and constituting the wadding which must be soaked with fuel.

Still a further object of the invention is to provide a lighter as aforesaid having such a structure that the wick-carrying body can be removed without requiring the use of any instrument and by a rapid and simple operation, the flint being housed in a member pivoted to the upper cover plate of the container and accommodating a control link system applying said flint against the friction wheel and which is actuated by the coverlike member, one part of which is so shaped as to act as a cam when the cover is opened.

And a still further object of the invention is to provide a lighter as aforesaid wherein owing to the above-stated structure the change of the flint is obtained simply by rocking the spring, the flint being accessible from outside without requiring any instrument, said lighter permitting in a simple manner an effective ignition of the wick also the rapid interchange of the parts to be obtained, all the operative elements being supported by the upper lid plate.

With these and such other objects in view as will incidentally appear hereafter, the invention comprises the novel construction and combination of parts that will now be described with reference to the accompanying drawing exemplifying the same and forming a part of the present disclosure.

In the drawing:

Figure 1 is a perspective view of the upper portion of the lighter, the arm forming the lid being shown in opened position.

Figure 2 is a vertical sectional view through the container along the line II—II of Fig. 1.

Fig. 3 is a part sectional view of the filling plug and wick-carrying element.

Figure 4 is a sectional view drawn to a larger scale along the line IV—IV of Fig. 1.

The lighter according to the invention com-

prises a container 1 generally of parallelepipedic shape covered with an upper lid 2 upon which are arranged all the operative parts for the ignition and the filling.

The container 1 contains inner wadding elements 3 arranged alongside the walls of this container, these elements being made of felt, cotton, asbestos or other suitable absorbent material. This inner wadding or lining 3 delineates in the central region of the container a cylindrical recess 4 in which is received the wick-carrying element 5. This element is constituted by an elongated cylindrical sleeve made of the same material as the lining 3 and in which are formed helical grooves for the insertion of a wick 6. The element 5 is secured at its upper end to the lower face of a screw-threaded plug 7 which, in closed position, engages a correspondingly screw-threaded perforation 8 in the lid 2 of the container 1. The screw-threaded plug 7 terminates at its upper end in a peripherally knurled disc 9 and has a vertical bore terminating at its upper end in a socket 10, said bore being transversely engaged by the wick 6. The plug 7 is also provided adjacent its lower end with a small recess 11 (diagrammatically illustrated in Fig. 3) delineated by an extension of the outer wall of the plug 7 engaging the outer surface of the upper part of element 5, and in which are wound a few convolutions of the wick so as to permit the latter partially to be pulled up without the entire structure having to be dismantled. The disc 9 has an offset perforation 12 and is provided on its lower face with a gasket 13 having a perforation coinciding with the perforation 12 of the disc 9 for permitting filling of the container to be effected as described hereinafter. When the cylindrical element and the plug 7 are inserted into the container by screwing down the plug 7 into the perforation 8, the disc 9 is applied against the lower shoulder of a shallow recess 14 provided in the lid 2, the gasket 13 being applied against the lid and ensuring proper tightness. An eccentric perforation 15 permits by coming into coincidence with the perforation 12 in the disc 9 the container to be filled by means of an ordinary fuel tube and pouring spout. It will be seen that the coincidence between the perforations 12 and 15 is obtained after tightening by imparting to the plug a pivotal motion equal to about one eighth of a revolution in the direction corresponding to its removal.

A longitudinal member 16 applied against the lid 2 is pivotally supported at 16a and provided adjacent the friction wheel with suitable housing recesses for the flint and for its control device, these members being hereafter described.

A lever arm 17 forming a cover pivotally carried at 18 is movable in a horizontal plane; it is so shaped as to constitute at 19 the cap for the wick, thereby preventing any evaporation of the fuel, and is furnished at 20 adjacent its end with a slightly convex knurled portion permitting finger control of its pivotal motion. During the closing operation, the arm or cover 17 is held in position by a boss 21 on the lid 2, said boss engaging a corresponding boss on the arm 17. Adjacent its hinge, the arm 17 terminates in a horizontal plate 22 so shaped at 23 to act camwise and operatively connected to a resilient open washer 24 acting as a pawl upon the ratchet-like lower face 25 of a friction wheel 26 pivotally carried at 18. The pivots 16a and 18 are interconnected by a fish plate 27.

The device for controlling the pressure of the

flint against the friction wheel 26 is constituted in the following manner as shown in Fig. 4. In the member 16 are formed a pair of blind holes 28, 29 communicating at 30 at their rear ends.

The flint 31 is accommodated partly in the blind hole 28 and is subjected to the action of a plunger 32 secured to the end of a spiral spring 33 one end of which is operatively connected to a lever 34 pivoted at 35 to a horizontal pin, the other arm of the lever being connected to a link 36 terminating in a plunger 37 abutted to the cam 23 of the arm 17. A spiral spring 38 is provided for constantly urging the plunger 37 back into contact with the cam 23.

The operation of the device which has just been described is as follows:

In order to ignite the lighter, the arm 17 is rocked leftwardly, for example by means of the thumb finger, whereupon this arm drives, owing to the rotation of its plate 22, the pawl washer 24 and the friction wheel 26. At the same time, the cam 23 operates the plunger 37 and shifts the link 36 against the spring 38 and rocks the lever 34, thereby applying the flint 31 against the friction wheel 26. A bunch of sparks is thereby produced, which ignites the wick 6, the latter having just been disengaged from the cap 19 responsive the pivotal motion of the arm 17, the fuel vapors which have gathered adjacent the wick when the lighter was left inoperative facilitating the ignition. When the cam 23 has moved beyond the intermediate portion in which it exerts upon the plunger 37 a given pressure, this plunger is returned to its original position under the action of the spring 38. In order to change the flint 31, it is only sufficient to rock the member 16 about its pivot 16a, whereby the flint becomes accessible at once.

In order to fill the lighter, the disc 9 is rotated to the approximate extent of one eighth of a revolution so as to bring the perforations 12, 15 into coincidence, thereby providing an aperture permitting direct filling. When it is desired to change the wick, it is only sufficient to unscrew the disc 9 to the full extent and to disengage the plug 7 and the wick-carrying cylinder 5 from the container. This can be done easily when the arm 17 is in open position.

Obviously modifications may be introduced in the constructional form as described without departing from the scope of the invention. Thus the disc 9 might have a larger diameter than the one shown on the drawing, the said disc being also partly covered by the member 16, the disengagement of this disc being rendered possible only after a pivotal motion of said member 16. There might also be provided in the upper plate of the lighter and in the screw-threaded plug a bore adapted to permit the filling of the container. It is also obvious that a resilient control member may be interposed in the cover so as to permit the same to be pivoted to open position after withdrawing the same from its closed position.

Minor constructional details of the lighter may vary without departing from the scope of the subjoined claims and it should be remembered that the words used to define each of the operating members of the lighter such as "flint," "friction wheel" and "wick" should be construed in a broad sense involving mechanical equivalencies and not in a restrictive sense.

What is claimed is:

1. A pyrophoric lighter comprising a fuel container wadded with an absorbent material and

5

providing a recess, said container being closed by a lid, an aperture in said lid, coinciding with said recess, a wick-carrying element made of absorbent material and removably located in said recess, a wick supported by said element, means on said element for engaging the wick, a plug mounted on the upper part of said element for engaging said aperture, a perforation in said plug for enabling the wick to project from the lid, a friction wheel mounted on said lid, means for controlling the rotation of said friction wheel, a spark-producing flint, and means for automatically applying said flint against said friction wheel when rotating the same.

2. A pyrophoric lighter comprising a fuel container wadded with an absorbent material and providing a cylindrical recess, said container being closed by a lid, an aperture in said lid coinciding with said recess, a cylindrical wick-carrying element made of absorbent material and removably located in said recess, a wick wound around said element, means on said element for receiving said wick, a plug mounted on the upper part of said element for engaging said aperture, a perforation in the plug for enabling the wick to project from the lid, a recess in the upper portion of said element under said perforation for receiving a few convolutions of said wick, a friction wheel mounted on said lid, means for controlling the rotation of said friction wheel, a spark-producing flint, and means for automatically applying said flint against said friction wheel when rotating the same.

3. A pyrophoric lighter comprising a fuel container wadded with an absorbent material and providing a recess, said container being closed by a lid, an aperture in said lid coinciding with said recess, a wick-carrying element made of absorbent material and removably located in said recess, a wick wound around said element, means on said element for retaining said wick, a plug mounted on the upper part of said element for engaging said aperture, a perforation in said plug for enabling the wick to project from the lid, a recess in the upper portion of said element under said perforation for receiving a few convolutions of said wick, a friction wheel pivotally mounted on said lid, means for rotating said friction wheel, a spark-producing flint, an L-shaped flint receiving member pivotally supported by said lid, the shorter leg of said member being located transversely to said container, a recess in said transverse leg for receiving the flint, and means located in said recess for automatically applying said flint against the friction wheel when rotating the same.

4. A pyrophoric lighter comprising a fuel container wadded with an absorbent material and providing a recess, said container being closed by a lid, a wick-carrying element made of absorbent material and removably located in said recess, a wick wound around said element, means on said element for retaining said wick, a perforation in said lid, a plug mounted on the upper part of said element for engaging said perforation, a second perforation in said plug for enabling the wick to project from the lid, a re-

6

cess in the upper portion of said element under said perforation for receiving a few convolutions of said wick, a friction wheel pivotally mounted on said lid, a cover for the wick projecting end, pivotally mounted on said lid about the axis of said friction wheel, means on said cover for engaging said friction wheel and for rotating the same when opening said cover, a spark-producing flint, an L-shaped flint receiving member pivotally supported by said lid, the shorter leg of said member being located transversely to said container, a recess in said leg for accommodating the flint, and means for automatically applying said flint against said friction-wheel when rotating said cover.

5. A pyrophoric lighter comprising a fuel container wadded with an absorbent material and providing a recess, said container being closed by a lid, an aperture in said lid, a wick-carrying element made of absorbent material and removably located in said recess, a wick wound around said element, means on said element for retaining the wick, a plug mounted on the upper part of said element for engaging said aperture, a perforation in said plug for enabling the wick to project from the lid, a friction wheel pivotally mounted on said lid, a cover for the wick projecting end, pivotally mounted on said lid about the axis of said friction wheel, means on said cover for engaging said friction wheel and for rotating the same when opening said cover, a spark-producing flint, an L-shaped flint receiving member pivotally supported by said lid, the shorter leg of said member being located transversely to said container, a recess in said leg for receiving the flint, a two-arm lever pivotally supported in said recess, a helical spring interposed between said lever and said flint, a cam shaped projection on said cover protruding towards said recess, and a plunger interposed between said lever and said cam shaped projection so as to rock said lever and to apply said flint against said friction wheel when opening and closing said cover.

ROBERT ERNEST CHÉROUVRIER.

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