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F. J. CAMM

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PYROPHORIC LIGHTER

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Fig. 1.

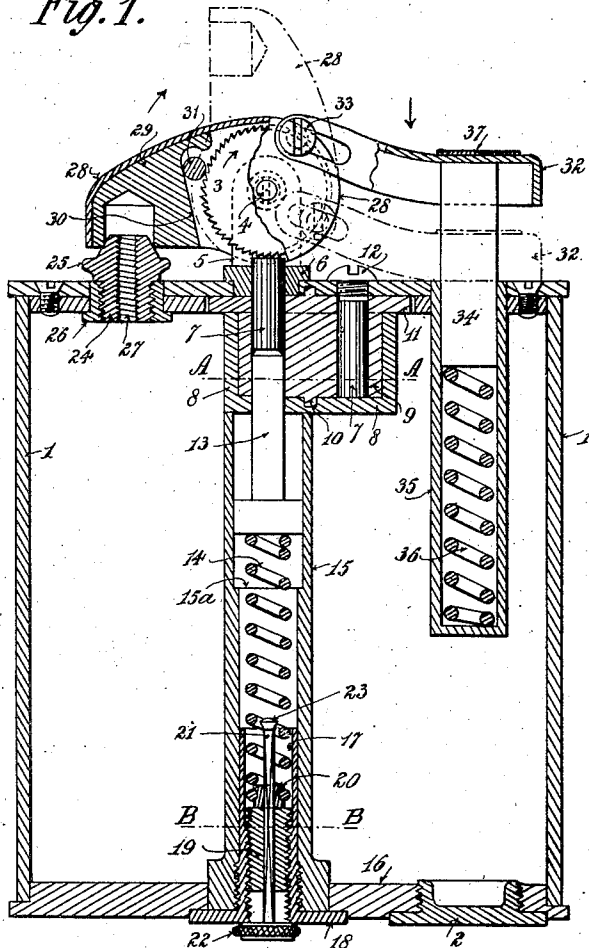


Fig. 2.

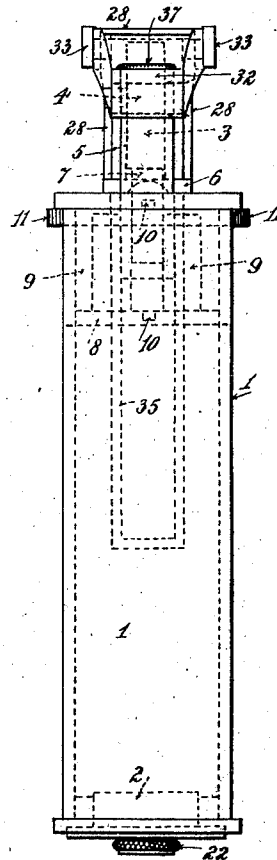


Fig. 3.

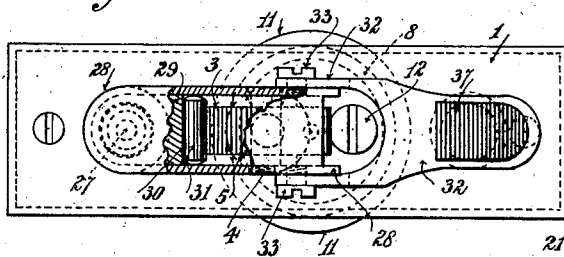
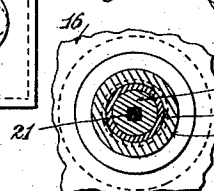


Fig. 4.



Fig. 5.



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UNITED STATES PATENT OFFICE

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PYROPHORIC LIGHTER

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1 Claim. (Cl. 67—7.1)

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This invention relates to improvements in pyrophoric lighters, particularly pocket lighters in which the abrasive "flint" wheel or circular milling cutter or the shaft on which it is fixed is not directly operable by the thumb of the operator but is operable indirectly by the depression of a spring controlled plunger or lever which is geared to an arm or housing provided with a snuffer for the wick. This arm or housing is usually provided with a spring pawl which is adapted to engage with radially arranged ratchet teeth formed on the sides of the "flint" wheel so as to rotate the latter on its axle in one direction, i. e. to abrade the "flint" to ignite the wick. Now it is not only inconvenient and expensive to provide the side of the "flint" wheel with ratchet teeth but what is more important, the spring controlled pawl adapted to engage the teeth usually takes the form of a blade spring, which owing to its proximity to the wick flame is liable to lose its temper and so becomes useless for its purpose.

Moreover a further and greater disadvantage in such a construction is the lost motion which takes place should the pawl fail to engage immediately with one of the ratchet teeth on the side of the "flint" wheel. Now the number of ratchet teeth on the side of a "flint" wheel is usually five in number, a greater number not being readily practicable; it follows that 72° of movement is lost should the pawl fail to engage immediately with one of the ratchet teeth when the plunger or lever is depressed. Further, owing to the pressure required to flex a relatively short and stiff blade spring pawl considerable power is required to obtain an easy return movement of the parts and an undesirable side-thrust is also exerted on the "flint" wheel.

Also in such lighters no provision has been made hitherto for carrying a supply of spare "flints" accessible for use adjacent to the abrading wheel so as to allow for a ready substitution of a fresh "flint" for one no longer usable.

Neither has it been possible without great difficulty to raise the wick from the nipple as it becomes consumed, because despite the usual transverse orifice usually provided in said nipple for the insertion of a pin to raise the wick, such an operation is practically impossible owing to the wick within the body of the lighter being so tightly packed and intertangled with the absorbent material within said body.

The present invention overcomes all the above mentioned drawbacks and results in the production of a lighter not only particularly easy to

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operate but less expensive to produce and incorporating only two compression springs, one for use in propelling the "flint" and one for returning the plunger or its equivalent and with it the snuffer to its initial position after use thus eliminating specially formed tailed and other types of springs which easily break. A further advantage resides in the fact that the lighter, when constructed as a pocket lighter, cannot be inadvertently operated unless in a vertical position for use.

The present invention comprises a pyrophoric lighter consisting of a suitably shaped closed receptacle adapted to contain absorbent material saturated with inflammable liquid, a closeable filling orifice for said liquid, an abrasive "flint" wheel indirectly operably mounted on the outside of the receptacle, a snuffer arm or housing moveable on the axis of the "flint" wheel, a roller (or ball) clutch of the one way type carried within said housing, a spring controlled finger operable lever or plunger pivotally connected to said housing in such wise that the "flint" wheel is partially rotated from the angular motion derived from operating the spring controlled lever or plunger, a magazine for a plurality of "flints" so arranged that one of said "flints" may be brought into such position as to allow its one end to be acted upon by the "flint" wheel, an adjustable spring for propelling the "flint" on to said wheel and a rotatable nipple on said receptacle arranged adjacent to said wheel and through the convoluted bore of which the free end of a wick contained within the receptacle can pass.

This invention will now be more particularly described making reference to the accompanying drawings in which:

Fig. 1 is a sectional view in side elevation—on an enlarged scale—of a pocket lighter embodying the present invention.

Fig. 2 is a view in end elevation of said lighter. Fig. 3 is a view in plan thereof, partly in section.

Fig. 4 is a view in section on line A—A of Fig. 1, and

Fig. 5 is a view in section on line B—B of Fig. 1. Throughout the views similar parts are denoted by like numerals of reference.

A closed oblong or other shaped receptacle 1 adapted to contain absorbent material—such as cotton wool—saturated with readily inflammable liquid and a wick, is provided on its underside with a liquid filling orifice closeable by a screw plug 2.

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On the top plate of said receptacle is mounted an abrasive "flint" wheel 3 in the form of a circular milling cutter with cutting teeth on its periphery. This wheel 3 is freely revoluble on an axle 4 carried in bearings formed in a bifurcated support 5 fixed on the top plate of the receptacle 1. The base of the support 5 is provided with a nipple 6 through which projects a "flint" 7, the top end of which is diametrically below and in contact with the teeth of the wheel 3.

The "flint" magazine comprises a cylindrical casing 8 fixed to the upper plate of the receptacle 1 and depending therein. Within the casing 8 is revolubly mounted a cylindrical block or barrel 9 of a height approximating to the length of the "flints" employed and adapted to be rotated on top and bottom centres 10 working in the bottom plate of the casing 8 and the top plate of the receptacle 1.

The block or barrel 9 is provided with a series of concentrically arranged chambers or pockets each of which is adapted to contain a single "flint" 7, see more particularly Fig. 4.

The upper edge of the block or barrel 9 is provided with a milled edge or flange 11 which is of such a diameter as to project through slots in the front and back faces of the receptacle 1 in order that the block or barrel may be readily rotated from outside the receptacle. Registering marks or other means may be provided to show or position the block or barrel 9 when a "flint" is in a position to project freely through the orifice in the nipple 6.

The "flints" are fed in to the chambers or pockets in the block 9 through an orifice in the top plate of the receptacle 1, which orifice is normally closed by a screw plug 12 or its equivalent.

The "flint" 7 in use is pressed upwardly into contact with the "flint" wheel 3 by means of a piston 13 passing through an orifice in the bottom of the casing 8 and under the influence of a compression spring 14. The piston 13 and spring 14 are contained within a cylindrical casing 15 secured by its top and bottom edges to the bottom of the casing 8 and lower plate 16 of the receptacle respectively.

The lower part of the spring 14 is carried within a sleeved plug 17 screwed into the casing 15 and operable by a head 18 on the exterior of the plate 16.

In order to readily adjust the compression of the spring 14, a screw threaded bush 19 is threaded centrally through the head 18 of the plug 17. A washer 20 carrying the lowermost coil of the spring 14 contacts with the upper surface of the bush 19 and centrally through it and the washer 20 is passed a spindle 21. This spindle 21 is of a square or other suitable non-circular cross-section working through correspondingly shaped holes in the bush 19 so that on rotating the spindle 21, the bush 19 and washer 20 is moved axially.

To rotate the spindle 21 its lower end terminates in a milled head 22 operable from the outside of the receptacle. The upper end of the spindle 21 terminates in a stop or button 23. The spindle 21 is frictionally held within the bush 19 and washer 20 or other suitable means may be provided to keep the parts in engagement.

On the top plate of the receptacle adjacent to the wheel 3 is carried the one end of the wick. This upper end of the wick projects through a nipple 24, the upper exterior surface of which is

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preferably coned as shown and is then provided with a milled flange 25.

The lower part of the nipple 24 is screw threaded to engage with an internally screw threaded bushing so as to allow the nipple 24 to be freely rotated exteriorly—by its flange 25—and within the top plate of the receptacle. The axial bore 27 for the wick through the nipple 24 is screw threaded or provided with helical undulations adapted to grip and engage the surface of the wick in such manner that on gripping the free or upper end of the wick to prevent its rotation and rotating the milled flange 25, the wick is raised or lowered.

The "flint" wheel 3 is rotated and a guard therefor and for the wick is provided in the following manner: An arm or lever 28 of a channel shape in cross section to which the axle 4 is fixed carries at its one end a fixed block 29 which is bored to fit over the nipple 24 and is provided with a tangential or inclined surface or slot 30. This surface or slot is so positioned or shaped in relation to the periphery of the wheel 3 that a roller 31 (or ball) interposed between said surface or slot 30 and the periphery of the wheel 3 is jammed against the latter when the arm or lever 28 is moved upwardly and so causing the wheel 3 to partially rotate or move angularly with said arm or lever, but when the latter moves downwardly into its initial position, the roller 31 (or ball) moves into a position at a greater distance from the axis of the wheel and lever, thus rolling on the periphery of the wheel and no longer driving the wheel. In order to ensure that the wheel 3 does not rotate on the return movement of the arm or lever 28, slight friction may be applied to the wheel in any convenient manner, for instance by a spring washer or by making the wheel a close fit on its axle. The pressure of the "flint" on the wheel may be sufficient for such purpose but in order to prevent undue wear on the "flint" it is preferable not to apply the requisite friction by highly compressing the "flint" spring, 14.

The lever 28 is operated by an aligned arm 32, the one end of which is bifurcated and slotted to receive headed studs 33 screwed into the circular side portions of the arm or lever 28. The opposite end of the arm 32 carries a depending plunger 34 sliding in a cylindrical casing 35 fixed to the top plate of the receptacle 1 and extending downwardly within the receptacle. The vertical movement of the plunger 34 is spring controlled preferably by a compression spring 36 contained within said casing 35. The free end of the arm 32 is furnished with a roughened operable plate 37.

In operation, on depressing the arm 32 against the action of its spring 36 the arm or lever 28 will be raised (the new positions are shown in dot and dash lines in Fig. 1) and at the same time the "flint" wheel 3 will be partially rotated by the roller 31 (or ball) jamming between the periphery of the wheel 3 and the surface 30 carried by the arm or lever 28, thus causing the teeth of the wheel 3 to engage with the "flint" so as to produce one or more sparks to ignite the wick. On removing pressure from the arm 32 it will move upwardly under the pressure of its spring 36 and the arm or lever will move downwardly to snuff out the wick, but the "flint" wheel 3 will remain stationary since the roller 31 moves out of jamming contact with the periphery of the wheel 3 and merely rolls thereon. It will be seen that as the roller 31 is free to rise and fall in a vertical

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direction when not in jamming contact with the wheel 3 should the lighter become inverted, for instance in the pocket, it will fail to function, if inadvertently operated, since the roller 31 will move out of jamming contact with the wheel 3.

When it becomes necessary to place a new "flint" in position for use, the pressure of the spring 14 is first reduced sufficiently either by unscrewing the sleeved plug 17 by its head 18 or unscrewing the bush 19 by operating the head 22 or by a combination of both operations until the piston 13 drops clear of the magazine casing 8, further downward movement of the piston 13 is prevented by a shoulder or stop 15a in the casing 15; the block or barrel 9 is then partially rotated by its milled edge 11 to bring the next "flint" 7 in line with the orifices in the casing 8 and nipple 6, the spring 14 is then re-compressed to bring the piston 13 into contact with the underside of the new "flint" and its top surface into contact with the wheel 3.

What I claim is:

A pyrophoric lighter comprising a suitably shaped closed receptacle adapted to contain absorbent material saturated with inflammable liquid, a closable liquid filling orifice in said receptacle, an abrasive "flint" wheel mounted in bearings on the outside of the receptacle, a wick nipple carried adjacently to the "flint" wheel, a channel shaped lever pivoted to the axis of the "flint" wheel and forming a guard therefor, a block carried within one end of the lever to form a snuffer for the wick and formed with a tangential surface contiguous to the periphery of the "flint" wheel, a roller (or ball) interposed be-

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tween such surface and the periphery of the "flint" wheel to form therewith a one way clutch, a bifurcated finger operable arm aligned with said lever and slotted to receive headed studs screwed into the sides of said lever, a spring controlled rectilinearly moving plunger depending from said arm, a magazine for a plurality of "flints" consisting of a series of concentrically and vertically arranged pockets, one for each "flint," formed in a barrel rotatably carried within a casing fixed within the upper part of the receptacle, a "flint" nipple carried on the top plate of the receptacle beneath the periphery of the "flint" wheel and the bore of said nipple communicating with one of said pockets and an adjustable spring operated from outside the receptacle for impelling the positioned "flint" on to the "flint" wheel, as set forth.

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