Jan. 1, 1935. L. V. ARONSON 1,986,754

FLAME PRODUCING MECHANISM

Filed April 9, 1934 2 Sheets-Sheet 1

Fig. 1.

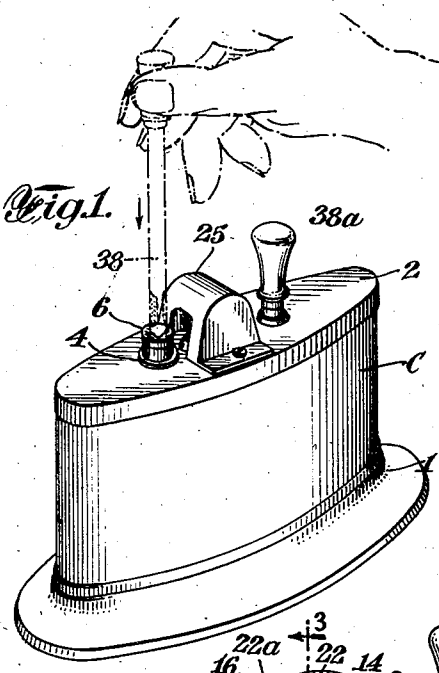
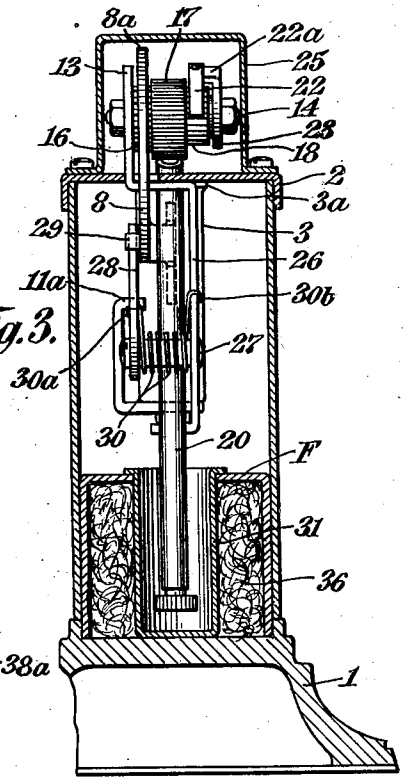


Fig. 3.



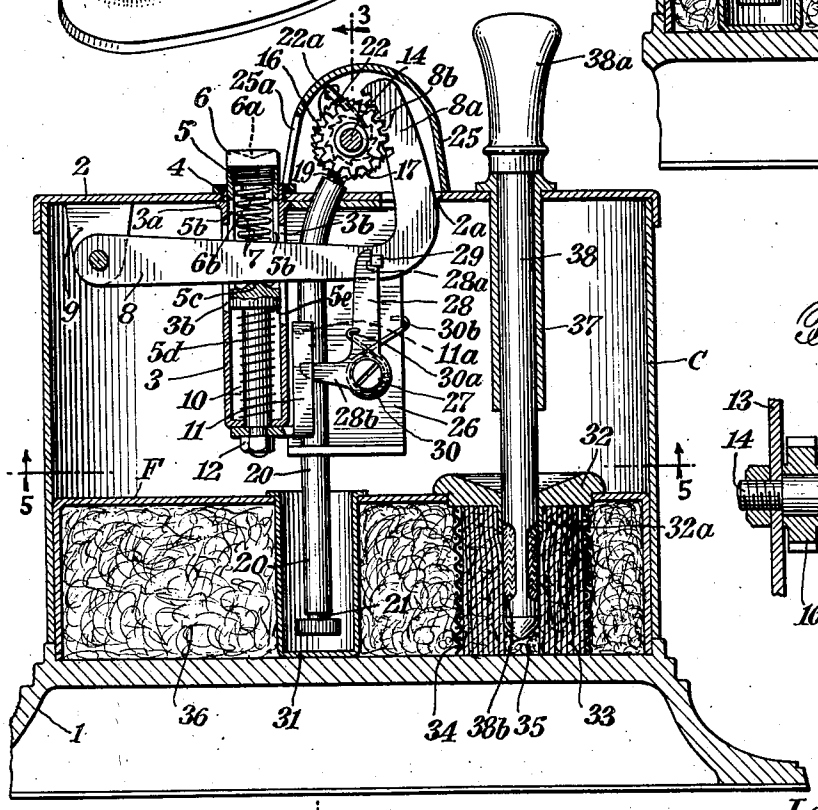
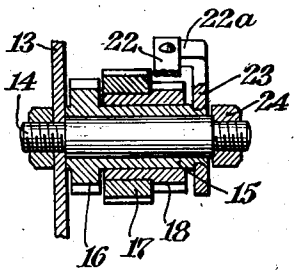


Fig. 2.

Fig. 4.



INVENTOR
Louis V. Aronson
BY
Ward, Crosby & Neal
ATTORNEYS

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Fig. 5.

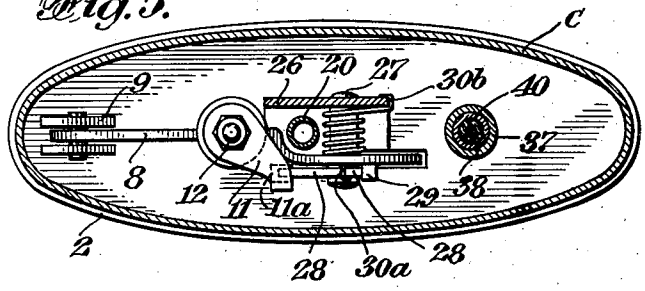


Fig. 8.

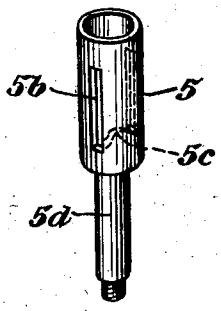


Fig. 6.

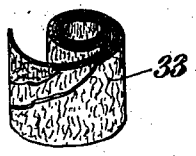


Fig. 9.

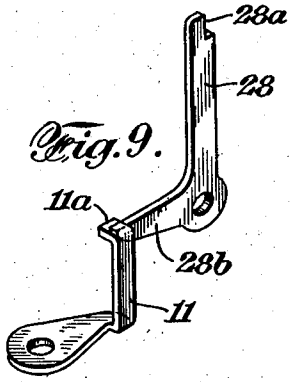
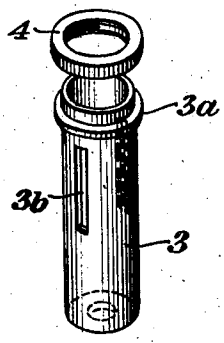


Fig. 7.

Fig. 10.



INVENTOR
Louis V. Aronson
BY
Hard, Cosby & Neal
ATTORNEYS

Patented Jan. 1, 1935 1,986,754

UNITED STATES PATENT OFFICE

1,986,754

FLAME PRODUCING MECHANISM

Louis V. Aronson, Newark, N. J.

Application April 9, 1934, Serial No. 719,640

3 Claims. (Cl. 67—4.1)

My invention relates to flame-producing mechanism utilizable for any desired purpose such, for example, as for the ignition of cigarettes, pipes, cigars or the like.

My invention has particular reference to a lighting device of the type embodying pyrophoric spark-producing mechanism adapted to be easily actuated for the purpose of igniting a charge of fuel carried by a suitable torch, which torch after being ignited may readily be moved about for lighting purposes.

My invention has further reference to a pyrophoric lighter comprising an actuating member which is depressed by engagement of a torch therewith to thereby supply the power for rotating a sparking wheel, said actuating member being held in depressed position by pressure of the torch and the actuating member holding the torch in line with the path of the sparks as produced by rotation of the sparking wheel.

Various other objects, advantages and features of my invention will become apparent from the following detailed description.

My invention resides in the flame-producing mechanism, combinations, features and arrangements of the character hereinafter described and claimed.

For an understanding of my invention and for an illustration of one of the many forms thereof, reference is to be had to the accompanying drawings, in which:

Figure 1 is a perspective view showing a flame-producing mechanism as constructed and operated in accordance with my invention;

Fig. 2 is a vertical sectional view, partly in elevation, of the mechanism shown in Fig. 1;

Fig. 3 is a transverse, vertical sectional view, partly in elevation, and is taken substantially on the line 3—3 of Fig. 2 looking in the direction of the arrows;

Fig. 4 is a transverse, vertical sectional view of the spark-producing mechanism;

Fig. 5 is a horizontal sectional view, partly in inverted plan, and is taken on the line 5—5 of Fig. 2 looking in the direction of the arrows;

Fig. 6 is a perspective view of a laminated structure adapted to be disposed interiorly of the fuel casing;

Fig. 7 is a vertical sectional view, partly in elevation, of the mechanism shown in Fig. 1; and

Figs. 8, 9 and 10 are detailed perspective views showing various parts of my novel mechanism.

Referring to the drawings, C represents a main casing which may be of oval or other suitable configuration, such casing being formed from sheet metal or other suitable material. In accordance with a preferred form of the invention, although not necessarily, the main casing C is open at the bottom so as to telescopically and detachably receive a fuel casing F which, likewise, may be formed from sheet metal, or equivalent material. As shown, the fuel casing F may have a base 1 suitably secured thereto, said base 1 serving as a support for the combined mechanism as will be obvious from a consideration of Fig. 2.

Secured in any suitable manner to the top of the main casing C is a cover plate 2 which, in accordance with a preferred form of the invention, forms a support for various parts of the hereinafter described operating mechanism.

Adjacent the center thereof, the aforesaid cover plate 2 is provided with a circular opening which receives the upper end of a hollow, cylindrical member 3 vertically secured to said cover plate 2 in any suitable manner. To this end, the member 3 may be provided with a flange 3*a* which is clamped against the lower cover plate surface by a nut 4 threaded to the extreme upper end of said member 3.

Freely slidable, interiorly of the cylindrical member 3, is a hollow, piston-like member or plunger 5 which may have a cap member 6 threaded into the upper end thereof. This cap member 6 may define a recess 6*a* in the upper surface thereof and the lower threaded shank section of said cap member 6 may be formed with a depending pin 6*b* utilizable for centering a helical spring 7 disposed in the upper end of said member 5.

As shown on the drawings, the cylindrical member 3 is provided with a pair of diametrically alined, vertically extending slots 3*b*. The member 5 is also provided with a pair of diametrically alined, vertically extending slots 5*b*. All of these slots are disposed in alined relation with respect to each other so as to freely receive a lever 8 extending transversely with respect thereto, one end of said lever 8 being pivoted to a lug 9 depending from the cover plate 2. As illustrated, the lower end of the helical spring 7 engages the lever 8 and the lower surface of said lever 8 engages a knob section 5*c* of the member 5.

The member 5 further comprises a depending stem section 5*d* around which is disposed a helical spring 10, the lower end of which rests upon the bottom wall of the cylindrical member 3 and the upper end of which engages the flanged surface 5*e* of the member 5. The stem section 5*d*

of the member 5 is freely slidable in an opening formed in said bottom wall of the cylindrical member 3. Below this bottom wall, the stem section 5*d* has a member 11 suitably secured thereto, as by a nut 12, said member 11 extending upwardly and terminating in a lateral section 11*a* utilizable as hereinafter described.

Secured to and upstanding from the cover plate 2 is a plate-like supporting member 13 on which a pin or axle 14 is horizontally anchored. This pin 14 has a sleeve 15 rotatably mounted thereon, said sleeve 15 having a pinion 16 either formed integrally therewith or anchored thereto so that the sleeve and pinion are rotatable together as a unit. The aforesaid lever 8 comprises an upwardly projecting section 8*a* which extends through a slot 2*a* formed in the cover plate 2. As shown on the drawings, this projecting section 8*a* of the lever 8 is formed with a plurality of rack teeth 8*b* which mesh with the pinion 16.

A pair of wheels 17 and 18 connected together for movement as a unit are loosely mounted on the aforesaid sleeve 15. As shown, the wheel 17 is a sparking wheel and it is formed with a serrated or roughened peripheral surface, such surface coacting with a pyrophoric element 19 disposed in the end of an elongated tube 20 suitably anchored in the cover plate 2. A suitable coil spring, not shown, which is disposed in the tube 20 seats against the upper end of a headed screw 21 and serves to bias the pyrophoric element 19 into engagement with the serrated surface of the wheel 17. The wheel 18 is formed with ratchet teeth on its periphery and coactable therewith is a suitable pawl 22 which, preferably, is of spring steel and so mounted that it tends to swing in a clockwise direction, Fig. 2, about its support 22*a*, the latter being a projecting section of a disk 23 mounted on that end of the sleeve 15 removed from the pinion 16, said disk 23 being suitably fixed to said sleeve 15 so as to be rotatable therewith as a unit and a nut 24, if deemed necessary, being threaded to the otherwise free end of the pin 14.

From a consideration of the drawings, it will be observed that the spark-producing mechanism above described is disposed adjacent the cap member 6. Such mechanism is so positioned and arranged that the sparks produced by clockwise rotative movement of the wheel 17, Fig. 2, pass along a diverging path which extends above the cap member 6. Preferably, the spark-producing mechanism is enclosed by a cap structure 25 which is secured to the cover plate 2 in any suitable manner, not shown. This cap structure is provided with a passage 25*a* through which sparks are adapted to pass along the path above noted.

Suitably secured to the cover plate 2 and depending therefrom is a plate-like supporting member 26 to the lower flanged surface of which the aforesaid elongated tube 20 may be suitably secured, if desired. Pivoted at 27 to the member 26 and suitably spaced therefrom by a spacing washer is a lever 28 which extends in a generally vertical direction and comprises a notched section 28*a* coactable with a member 29 projecting from the aforesaid lever 8. The lever 28 further comprises a section 28*b* which extends in generally a horizontal direction and is so positioned that the end thereof is in the path of the lateral section 11*a* of the aforesaid member 11. The lever 28 is suitably biased in a clockwise direction, Fig. 2, and, to this end, there may be utilized a spring 30 which is coiled around the aforesaid spacing sleeve, one end 30*a* of said spring engaging the lever 28 and the other spring end 30*b* engaging the member 26.

The above noted fuel casing F, in correspondence with the configuration of the main casing C, may be and preferably is of oval configuration and, preferably, said fuel casing F is detachably received in the lower end of the main casing C. As shown, said fuel casing F, when the elongated tube 20 is of sufficient length, may have a cup-shaped member 31 seated therein, this member 31 receiving the lower end of the tube 20.

Frictionally and detachably secured to the upper surface of the fuel casing F is a cap 32 which comprises a depending sleeve-like section 32*a* adapted to be introduced interiorly of the upper end of a vertical passage defined by a structure 33 formed from a strip of suitable laminated material, such as felt, which is spirally wound in the manner indicated in Fig. 6 and retained in such configuration by adhesive secured to the adjacent surfaces of the felt strip. Preferably, a member 34 of open mesh material, such as may be fabricated from copper wire, is disposed around the structure 33 to more firmly retain it in the configuration indicated. Further, as shown in Fig. 2, the lower end of the passage defined by said structure 33 may be closed by a wad 35 of suitable absorbent material or the like.

As illustrated in Fig. 2, the fuel casing F contains a mass of suitable absorbent material 36 such, for example, as cotton. Assuming that this absorbent material 36 together with the structure 33 have been disposed within the fuel casing F as shown, the cap 32 may be secured to the top wall of said fuel casing F with the sleeve section 32*a* thereof depending into the upper part of the passage defined by the structure 33. In this manner, said structure may be held interiorly of the fuel casing F in the position shown in Fig. 2.

The aforesaid cover plate 2 is formed with an opening for the reception of a tubular member 37 which depends from and is anchored to said cover plate 2, the interior passage defined by this tubular member being open at both ends and disposed in alinement with the passage defined by the aforesaid sleeve-like section 32*a* of the cap member 32.

As shown in Fig. 2, the aforesaid tubular member 37 is adapted to receive, in readily detachable manner, an elongated member 38 formed with a handle section 38*a*, the lower flanged surface of which rests upon the upper end of said tubular member 37. The lower part of the member 38 is shown as received by the continuous passage formed in the cap member 32 and the structure 33.

The member 38 is formed of suitable material such as metal and, as illustrated in Fig. 7, it is of tubular construction and has a stem 39 of metal or equivalent material, this stem carrying a detachable fabric sleeve 40 formed, for example, from cotton or asbestos strands woven or knitted to form the fabric. The lower end of the stem 39 terminates in a head 41 having a reduced section 41*a* adapted to be inserted into and frictionally engage the lower interior surface of the member 38. As clearly shown on the drawings, the lower end of the member 38 is cut away to form one or more passages 38*b* whereby the underlying section or sections of the fabric sleeve 40 are exposed.

With the form of the invention herein illustrated, the fuel casing F may be removed from the main casing C when it becomes necessary to

refuel said casing F, the fuel which is thus utilized being of any suitable kind such, for example, as heretofore utilized for supplying conventional pyrophoric lighters. With the present invention, it is desirable that a high test gasoline be utilized for fueling purposes and, accordingly, with the fuel casing F removed from the main casing C, a suitable quantity of such gasoline may be introduced into said fuel casing by passing the same through the opening in the cap 32 thereof. This fuel is taken up largely by the absorbent material 36 and to some extent by the felt structure 33.

With the various parts of the mechanism in normal position as shown in Fig. 2, fuel fumes or liquid fuel as such passes from the absorbent material 36, through the open mesh section 34, and through the felt structure 33, the fuel being then absorbed by the fabric sleeve 40 which, as stated, is disposed within the tubular member 38. Due to the fact that the fabric sleeve 40 extends upwardly within the tubular member 38, it results that the upper part of said fabric sleeve takes up a quantity of fuel and, therefore, in a sense, acts as a fuel reservoir of limited capacity.

With the parts in normal position as shown in Fig. 2, it will be obvious that the lower end of the tubular member 38 serves as a closure for the fuel casing F. This is necessarily true since a close fit exists between said tubular member and the sleeve section 32*a* of the cap member 32. The vertical passage in the felt structure 33 is somewhat smaller in diameter than that of the tubular member 38 and, therefore, the latter is resiliently engaged and gripped by said felt structure 33 to thereby enhance the sealing action to some extent.

When the herein described mechanism is to be operated, the handle section 38*a* is grasped by the fingers of one hand and lifted upwardly to entirely remove the member 38 from the tubular member 37. The member 38 is then disposed in the position shown in Fig. 1 with the head 41 at the lower end thereof disposed within the recess 6*a* of the cap member 6. While thus held in substantially vertical position, downward pressure is applied to the member 38 and, as a result, the member 5 is moved downwardly within the hollow cylinder 3 to thereby compress the springs 7 and 10. During this initial downward movement of the member 5, the lever 8 remains stationary by reason of the fact that the lateral pin 29 thereof is in engagement with the notched section 28*a* of the lever 28.

As hereinbefore stated, the stem section 5*d* of the member 5 and the member 11 are connected to the member 5 for movement together as a unit. Accordingly, during downward movement of the member 5, the lateral section 11*a* of the member 11 moves downwardly and eventually comes into engagement with the end of the lever section 28*b*. The various parts are shown in Fig. 7 in the respective positions occupied thereby just after the lateral section 11*a* of the member 11 has engaged the end of said lever section 28*b*. During slight continued downward movement of the member 11, the lever 28 is rocked further in a counter-clockwise direction, Fig. 7, to entirely disengage the notched lever end 28*a* from the pin 29. When disengagement is thus effected, the lever 8, which heretofore has served as a stop surface for the bottom section of the spring 7, is freed from restraint and, accordingly, said spring 7 expands suddenly to thereby rock said lever 8 in a clockwise direction, Figs. 2 and 7, in a snapping manner. In response to such movement of the lever 8, a quick step of rotative movement is imparted to the pinion 16, the sleeve 15 and the disk 23. The pawl 22 is carried by the disk 23 and, accordingly, in response to such rotative movement of the disk 23, said pawl 22 serves to impart a step of rotative movement to the ratchet wheel 18 in a clockwise direction, Figs. 2 and 7. The serrated wheel 17 moves with the ratchet wheel 18 as a unit and, therefore, said serrated wheel 17 partakes of a quick step of rotative movement and, because engaged by the pyrophoric element 19, serves to produce a shower of sparks which are directed along a path extending toward and above the cap member 6. Inasmuch as the member 38 is pressed downwardly against the cap member 6 at this time, it results that the pyrophoric sparks ignite the fuel carried by the exposed sections of the fabric sleeve 40.

As a result of the foregoing, a flame is produced at the lower end of the member 38 which becomes, in effect, a torch and, as such, it may be used to perform any desired lighting operation. The torch may readily and quickly be conveyed to any object to be ignited and, in so doing, it may be passed from hand to hand or to different persons in order to accomplish a plurality of lighting operations.

After the member 38 has served its intended purpose as a torch, it may be reinserted into and passed downwardly through the tubular member 37. By so doing, the flame is necessarily extinguished although, of course, the flame may be extinguished prior to reinsertion of said member 38 into the tubular member 37. As soon as the member 38 has been returned to its normal position as shown in Fig. 2, fuel is taken up by the wick member 40 at the exposed wick sections defined by the openings 38*b*. This fuel, to some extent, is absorbed by the upper section of the wick member 40 removed from the openings 38*b*. The member 38, therefore, is well adapted for subsequent use as a torch because it contains a quantity of fuel sufficient to maintain a freely burning flame for an extended period of time.

When the member 5 was moved downwardly by the member 38 as described, the springs 7 and 10 were compressed. When the notched lever section 28*a* became disengaged from the pin 29, sudden expansion of the spring 7 occurred and this was accompanied by further compression of the spring 10, the spring 7, at this time, becoming fully expanded or substantially so.

As soon as the torch member 38 is removed from the member 5, the spring 10 is permitted to expand to return the parts to their normal respective positions as shown in Fig. 2. In so doing, the member 5 is moved upwardly to elevate the spring 7 and to swing the lever 8 in a counterclockwise direction, Fig. 2, to such extent that the pin 29 thereon is again engaged with the notched end 28*a* of the lever 28 which is biased in a clockwise direction, Fig. 2, by the spring 30. When the lever 8 is thus swung in a counterclockwise direction, the pinion 16, sleeve 15 and disk 23 partake of a step of reverse rotative movement. During such movement, the pawl 22 idles with respect to the ratchet wheel 18 and, therefore, this wheel together with the serrated wheel 17 remain stationary.

As clearly appears from a consideration of Fig. 2, the spring 7 should be "heavy" while the spring 10 should be "light". That is, the spring

7, to a suitable degree, should be more resistant to compression than the spring 10.

The spring 7, or equivalent, of the herein described mechanism serves as a means for actuating the spark-producing means by a snap action to produce the desired shower of sparks. While storing energy in the spring 7 and, thereafter, operation of said spring for the intended purpose is restrained by the latching means comprising the lever 28, or equivalent. In the preferred form of the invention herein shown, energy is stored in the spring 7, or equivalent, and the latching means is released by operating means which comprises the member 38, or equivalent, carrying the charge of fuel.

It is to be understood that the mechanism hereinbefore specifically described is illustrative of but one of the many embodiments of the invention. Thus, for example, in lieu of the described spark-producing mechanism, it shall be understood that other equivalent arrangements for obtaining uni-directional movement of a serrated wheel may be utilized. Furthermore, it is to be understood that fuel may be supplied to the fuel casing F in any convenient manner otherwise than as herein described. It shall also be understood that the sealing arrangement for the lower end of the tubular member 50 may assume any one of a variety of forms in accordance with the broad purview of the invention.

While the invention has been described with respect to a certain particular preferred example which gives satisfactory results, it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended therefore in the appended claims to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent is:

1. A pyrophoric lighter having a receptacle, a rotatable sparking wheel mounted on said receptacle, a pyrophoric metal piece bearing against said wheel, a sparking wheel actuating member located substantially in the plane of said sparking wheel, a spring urging said actuating member toward a position at one limit of its stroke wherein said actuating member is idle, a manually operable torch engageable with said actuating member to depress the latter into a position at the opposite limit of its stroke and hold said actuating member in said last mentioned position, said actuating member when in its last mentioned position holding the torch in position to receive sparks projected from said wheel, and mechanism interposed between said actuating member and the sparking wheel whereby the aforesaid pressure of the torch against the actuating member is transmitted to the sparking wheel and utilized to turn the wheel and thereby project sparks against the torch while the latter is pressing against the actuating member.

2. A pyrophoric lighter having a receptacle, a rotatable sparking wheel mounted on said receptacle, a pyrophoric metal piece bearing against said wheel, a reciprocably mounted sparking wheel actuating member located substantially in the plane of said sparking wheel, a manually operable torch engageable with said actuating member to depress the latter from idle position into a position where the torch when engaging said actuating member is substantially in line with sparks projecting from the sparking wheel, a spring urging said actuating member toward idle position, and mechanism interposed between said actuating member and the sparking wheel whereby mechanical pressure imposed on said actuating member when depressed by the torch, is transmitted to the sparking wheel to rotate the latter during depression of the actuating member and project sparks onto the torch, said mechanism including a spring in which energy is stored during the initial part of the depression of said actuating member, and a latch positioned to release said spring, and members interposed between the spring and the sparking wheel to rotate the latter when the spring is released by said latch.

3. A pyrophoric lighter having a receptacle, a rotatable sparking wheel, a pyrophoric metal piece bearing against said wheel, a reciprocable actuating member, a first spring, mechanism connecting said spring and sparking wheel, a torch engageable with said actuating member to depress the latter upon application of manual pressure thereto and store energy in said spring, a latch restraining operation of said spring, continued depression of said actuating member releasing said latch whereby said spring becomes effective to rotate said sparking wheel, and a second spring in which energy is stored by said first spring upon release of said latch, said second spring restoring the parts to normal position upon removal of said torch from said actuating member.

LOUIS V. ARONSON.

CERTIFICATE OF CORRECTION.

Patent No. 1,986,754. January 1, 1935.

LOUIS V. ARONSON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, line 22, claim 2, for "projecting" read projected; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of February, A. D. 1935.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.