

Oct. 4, 1955

W. I. NISSEN

2,719,421

LIGHTER ACTUATING MECHANISM

Filed March 11, 1952

3 Sheets—Sheet 2

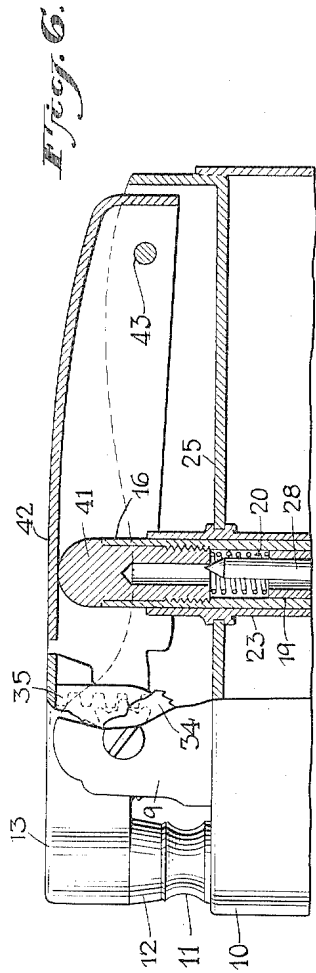


Fig. 6.

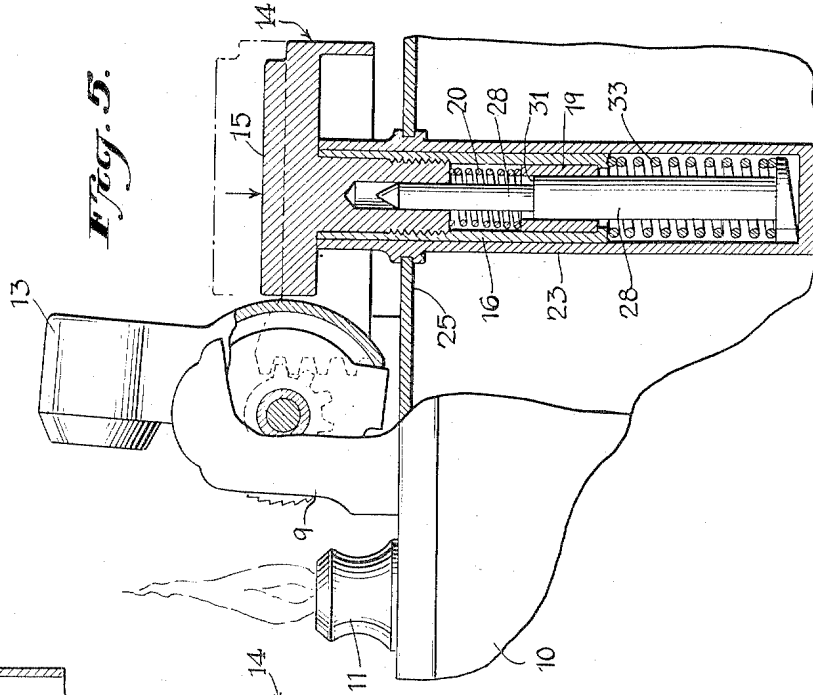


Fig. 5.

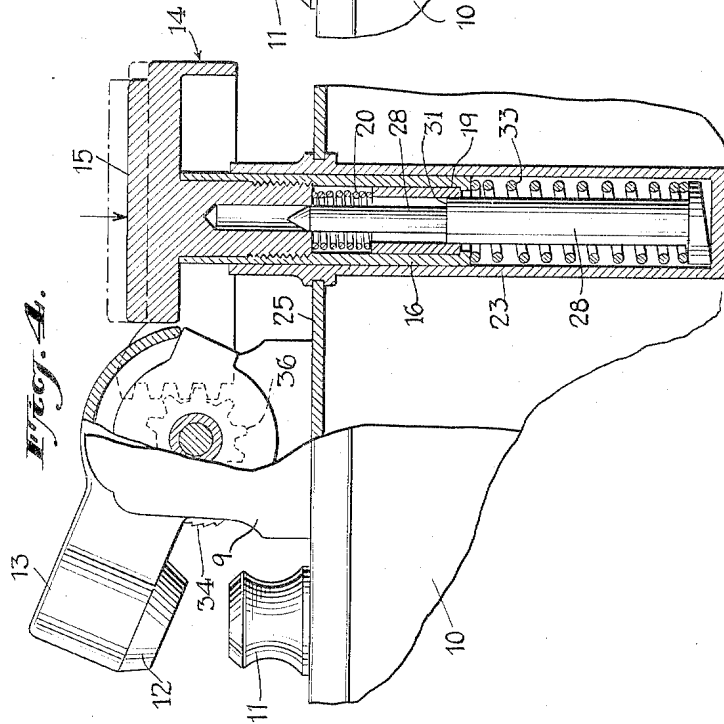


Fig. 4.

INVENTOR.
WARREN I. NISSEN.
BY *Ward, Crosby & Neal*
ATTORNEYS.

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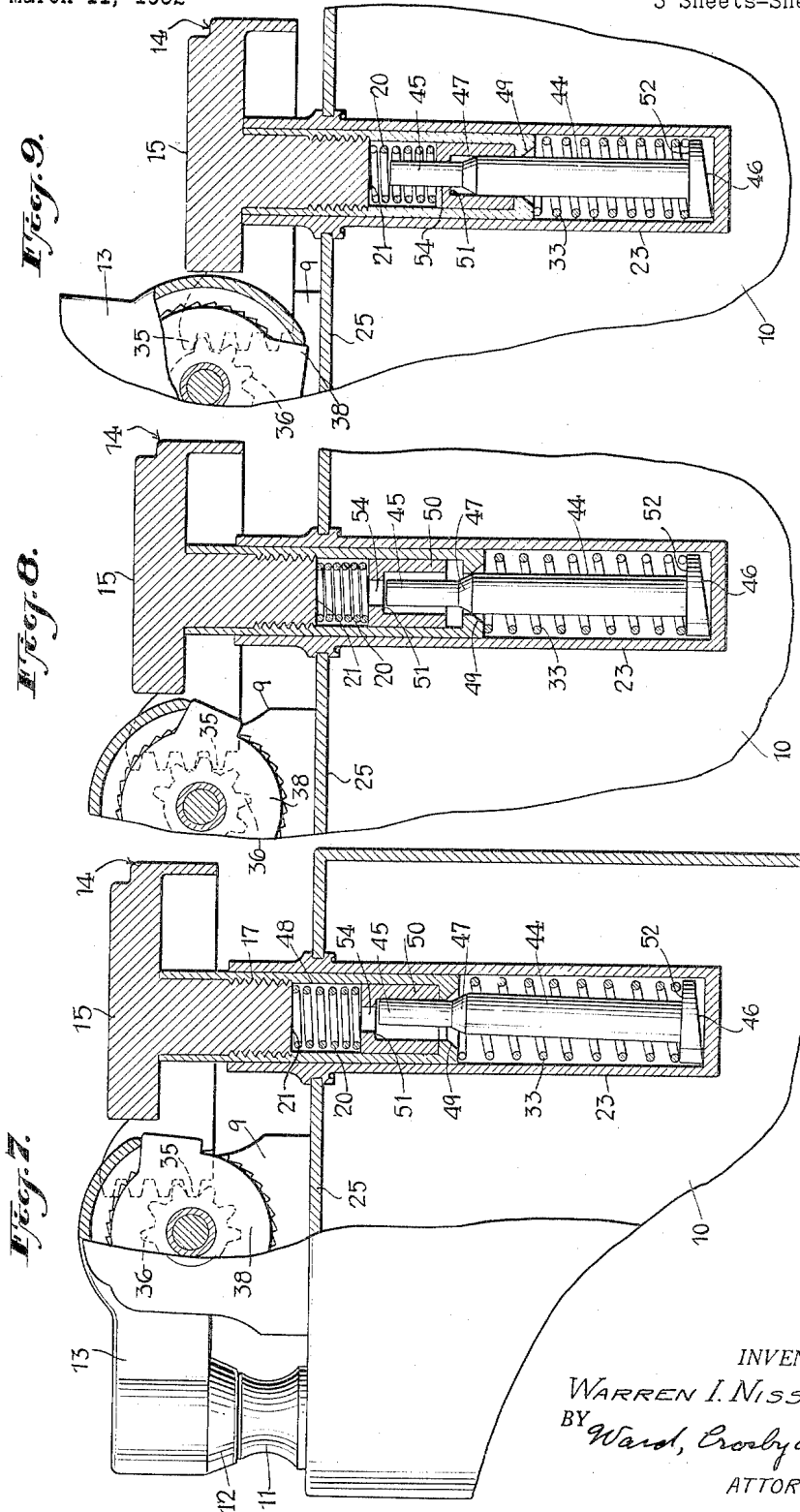
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WARREN I. NISSEN.
BY *Ward, Crosby & Neal*
ATTORNEYS.

1

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LIGHTER ACTUATING MECHANISM

Warren I. Nissen, Basking Ridge, N. J., assignor to Ronson Corporation, a corporation of New Jersey

Application March 11, 1952, Serial No. 275,888

14 Claims. (Cl. 67-7.1)

This invention relates to pyrophoric lighters of the type wherein a fingerpiece or manually operable member is positively connected to the sparking mechanism to actuate the mechanism, and particularly to an improved form of actuating mechanism for lighters of this type.

To secure adequate spark production and reliable ignition in lighters of the type mentioned above, it is important that the fingerpiece or manually operable member be operated vigorously enough to insure rapid motion of the sparking wheel forming part of the sparking mechanism. Heretofore, most lighters of this type depended for ignition on the dexterity with which the user could depress the manually operable member. Excessive spring pressure on the pyrophoric material or a dull sparking wheel often required that the user depress or otherwise operate the manually operable member several times in order to obtain a flame.

In accordance with the present invention, a latch pin is positioned in the path of movement of the manually operable member or a further member associated therewith in such a manner as to obstruct movement of the manually operable member until a predetermined pressure is applied to the member. When the predetermined pressure is reached, the latching pin is moved to such a position that the manually operable member is released, and thus the sparking mechanism is rapidly actuated producing a large number of sparks which readily ignite the fuel issuing from an adjacent burner.

It is an object of my invention to produce a lighter-actuating mechanism which is simple and economical to manufacture and which, after a predetermined pressure is applied to the mechanism, causes rapid actuation of a sparking wheel.

In the preferred embodiment of my invention, the manually operable member also actuates a cap or snuffer which moves from burner-covering to burner-exposing positions as the manually operable member is moved from its idle to active positions. In accordance with my invention, the manually operable member moves a short distance during the pressure build-up period and therefore the burner is exposed when rapid rotation of the sparking wheel occurs.

Further objects and advantages of the invention will be in part obvious and in part specifically referred to in the description hereinafter set forth which, taken in conjunction with the accompanying drawings, discloses a preferred form and a modified form of a lighter which is constructed in accordance with the invention. The disclosure, however, should be considered as merely illustrative of the principles of the invention.

Referring to the drawings:

Fig. 1 is a side elevation view of one embodiment of my invention;

Fig. 2 is a fragmentary enlarged side elevation view, partly in cross section, of the embodiment shown in Fig. 1;

Fig. 3 is a fragmentary cross-section view of a portion of the actuating mechanism shown in Fig. 2 and illus-

2

trates the relative positions of the parts after pressure has been applied to the manually operable member and prior to disengagement of the latching pin from the manually operable member;

Fig. 4 is a fragmentary side elevation view, partly in cross section, of the actuating mechanism shown in Figs. 2 and 3, which illustrates the relative positions of the parts of the actuating mechanism shortly after the manually operable member has been released by the latch pin;

Fig. 5 is a fragmentary side elevation view, partly in cross section, of the lighter shown in the preceding figures and which illustrates the relative positions of the parts when the manually operable member is completely depressed and the fuel issuing from the burner has been ignited;

Fig. 6 is a fragmentary side elevation view, partly in cross section, of a modified form of the invention;

Fig. 7 is a fragmentary side elevation view, partly in cross section, of a further modification of the invention and illustrates the relative parts thereof in their idle positions; and

Figs. 8 and 9 are fragmentary side elevation views, partly in cross section, of the embodiment of the invention shown in Fig. 7, and these figures illustrate respectively the relative positions of the parts at the moment of release of the fingerpiece and after the fingerpiece has been fully depressed.

Referring to Figs. 1-5, the first embodiment of my invention comprises a casing 10 having mounted on the top wall thereof a burner 11, a snuffer 12 associated with a cap 13, and a manually operable member 14. The casing 10 may contain either a liquid fuel, such as benzene, or a fuel which issues as a gas, such as butane or propane. The burner 11 may take the form of a wick tube in the event that fuel such as benzene is employed, or if the fuel is butane or propane or a similar fuel, the burner 11 may be a nozzle therefor.

The manually operable member 14 comprises a fingerpiece 15 which has a hollow plunger 16 secured thereto as by threads 17. The plunger 16 has an inwardly-extending annular shoulder 18 at the end thereof remote from the fingerpiece 15 which retains a sleeve 19 slidably mounted in the plunger. A spring 20 is mounted between the portion 21 of the fingerpiece 15 and the sleeve 19 so as to urge the sleeve 19 away from the portion 21. The portion 21 of the fingerpiece 15 has an aperture 22 therein for purposes hereinafter described.

A tube in the form of cylinder 23 which is open at its upper end and which is closed at its lower end by a wall 24 is mounted on the top wall 25 of the casing 10. The cylinder is secured to the top wall 25 as by the ridges 26 and 27 and, if necessary, by solder and the closed end 24 of the cylinder 23 is within the casing.

A latch pin 28 is mounted within the cylinder 23 and the sleeve 19. The latch pin 28 has oppositely slanted end portions 29 and 30, the end portion 30 preferably being conical and the end portion 29 preferably lying in a plane which forms an acute angle with the axis of the latch pin 28. The latch pin 28 also has a shoulder 31 intermediate the ends 29 and 30, and also preferably has a shoulder 32 adjacent the end 30. A spring 33 is mounted between the end of the plunger 16 and the shoulder 32 and serves both to urge the manually operable member 14, and hence the fingerpiece 15 toward its idle position, and to hold the latch pin 28 in the tilted position shown in Fig. 2, the slanted end 30 causing the latch pin 28 to tilt when pressure is applied to the shoulder 32.

The manually operable member 14 is drivably interconnected with a sparking wheel 34 and the cap 13 by means of a rack 35 which may be formed integrally with the fingerpiece 15, a pinion gear 36 mounted on a

3

shaft 37 supported by ears 9 and a pawl plate 38 which engages the cap 13 so as to be driven thereby and which engages teeth on the sparking wheel 34 so as to rotate the sparking wheel 34 as the manually operable member 14 is moved from the idle position shown in Fig. 2 to the active position shown in Fig. 5. This driving interconnection between the manually operable member 14 and the cap 13 and the sparking wheel 34 which I have shown is only one form of known types of driving mechanisms which may be employed in connection with my invention.

A pyrophoric material, such as the spring-pressed flint rod 39 extending from the flint tube 40, presses against the serrated face of the sparking wheel 34 so as to produce a shower of sparks at the burner 11 when the sparking wheel 34 is rotated by the manually operable member 14.

When the manually operable member 14 is in the idle position shown in Figs. 1 and 2, the shoulder 31 of the latch pin 28 is in the path of movement of the manually operable member 14 and is engageable with the sleeve 19 as the fingerpiece is pushed downward toward the top wall 25. Also, in the idle position the conical end 29 of the latch pin 28 is preferably in contact with the portion 21 of the fingerpiece 15 surrounding the aperture 22, the aperture 22 being sufficiently large to receive the end portion of the latch pin 28. As the manually operable member 14 is depressed, the latch pin 28 moves toward a vertical position and in alignment with the path of movement of the manually operable member 14. Thus, after the member 14 has been depressed a short distance, the shoulder 31 engages the end of the sleeve 19 most remote from the fingerpiece 15 and the latch pin 28 moves from the position shown in dotted lines to the position shown in solid lines in Fig. 3. As the member 14 is further depressed, the sleeve 19 moves upwardly, and the latch pin 28 is moved to a more nearly vertical position because of the engagement of the end 29 with the portion 21. As the sleeve 19 moves upwardly, the spring 20 is depressed and it increases the pressure between the end of the sleeve 19 and the shoulder 31 and also increases the pressure required on the fingerpiece 15. As the member 14 is depressed, the spring 33 also is compressed tending to retain the latch pin 28 in its tilted position and tending to increase the pressure required on the fingerpiece 15 to depress the member 14.

After the member 14 is depressed a predetermined distance, the latch pin 28 is moved to a vertical position in which the sleeve 19 can slip past the shoulder 31 and the parts of the mechanism assume the positions shown in Fig. 4. As soon as the sleeve 19 is able to slip past the shoulder 31, the obstructing force on the member 14 is suddenly released and the manual pressure on the fingerpiece 15 causes the member 14 to move rapidly to the position shown in Fig. 5. Rapid movement of the member 14 also causes the sparking wheel 34 through the medium of the driving mechanism to rotate rapidly and produce a large number of sparks at the burner 11, the sparks causing the fuel issuing from the burner to ignite.

Thus, it will be seen from the above that the mechanism of my invention requires a predetermined pressure on the member 14 before the sparking wheel 34 can be rotated rapidly enough to produce sparks for the ignition of the fuel issuing from the burner 11. Also, as soon as the predetermined pressure is applied, the member 14 is depressed rapidly and substantially independently of the operator's control causing a large number of sparks to be produced at the burner 11 each time that the lighting mechanism is actuated.

It will also be noted that regardless of the relationship of the pawl 38 to the teeth on the wheel 34 the provision of the sleeve 19 and the spring 20 will cause the member 14 to be depressed a short distance before the sparking wheel 34 is rotated at a speed sufficient to produce sparks at the burner 11, and hence because of the driving interconnection between member 14 and the cap 13, the burner

4

is at least partially exposed before the shower of sparks commences. Furthermore, the slidable sleeve 19 and the spring 20 permit a certain amount of momentum to be built up before the sparking wheel is rotated at a rapid rate.

Referring to Fig. 6 which illustrates a modification of my invention, it will be seen that the plunger 16 is connected to a member 41 having a rounded end and corresponding in function to the extension on the fingerpiece 15 which engages the plunger 16 in the embodiment shown in Figs. 1-5. The member 41 is in engagement with a fingerpiece 42 which is pivoted at one end on a pin 43. The fingerpiece 42 may be drivingly connected to the sparking wheel 34 and the cap 13 in the same manner as the member 14 shown in Figs. 1-5. Thus, as the fingerpiece 42 is depressed, the member 41 is also depressed and the operation of the lighter-actuating mechanism is the same as that heretofore described. The member 41 is provided with a rounded end so as to reduce the friction between the member 41 and the fingerpiece 42.

Referring to Figs. 7-9, the modification of the invention shown therein differs from the embodiments previously described principally in the configuration of the latch pin and the parts associated therewith to produce the action heretofore described. As shown in these figures, the latch pin 44 has a blunt end 45, a slanted end 46 and an intermediate tapered shoulder 47 preferably in the form of a truncated cone. The aperture 22 provided in the member 14 of the embodiments shown in Figs. 1-6 may be omitted in the member 14 shown in Figs. 7-9.

A hollow plunger 48 is secured to the fingerpiece 15 as by threads 17 and the plunger 48 has an inwardly-extending, annular, tapered shoulder 49 at the end thereof remote from the fingerpiece 15. The inner side of the shoulder 49 which faces the fingerpiece 15 retains a sleeve 50 which is slidably mounted in the plunger 48. The sleeve 50 has an inwardly-extending annular shoulder 51 which is engageable with the end 45 of the latch pin 44. A spring 20 is mounted between the end 21 of the fingerpiece 15 and the sleeve 50 so as to urge the sleeve 50 away from the end 21. A spring 33 is provided intermediate the end of the hollow plunger 50 and the shoulder 52 at the end of the latch pin 44 for the purpose of urging the pin 44 into a tilted position and returning the fingerpiece 15 to its idle position.

When the manually operable member 14 is in the idle position shown in Fig. 7, the end 45 of the latch pin 44 is in the path of movement of the sleeve 50 and is engageable with the shoulder 51 on the upper end of the sleeve 50 as the fingerpiece 15 is pushed downward toward the top wall 25. In the idle position the tapered shoulder 47 of the latch pin 44 is preferably slightly spaced from the tapered shoulder 49 provided on the end of the plunger 48. As the manually operable member 14 is depressed, the sleeve 50 is held stationary by the latch pin 44 causing the springs 20 and 33 to compress, and the tapered shoulder 49 engages the tapered shoulder 47 causing the latch pin 44 to move toward a vertical position in which the end 45 is in alignment with the aperture 54 in the sleeve 50. Thus, after the member 14 has been depressed a short distance, the latch pin 44 is moved from the position shown in Fig. 7 to the position shown in Fig. 8, the latter figure illustrating the relative positions of the parts at the moment that the member 14 is suddenly released.

As soon as the latch pin 44 reaches the position shown in Fig. 8, the sleeve 50 is able to slip past the end 45 of the latch pin 44, and a portion of the retarding force on the member 14 is suddenly removed. The manual pressure on the fingerpiece 15 then causes the member 14 to move rapidly to the position shown in Fig. 9. Rapid movement of the member 14 causes the sparking wheel 34, through the medium of the driving mechanism,

5

to rotate rapidly and produce a large number of sparks at the burner 11.

Thus, it will be seen that the operation of the modification shown in Figs. 7-9 is essentially the same as that of the embodiments shown in Figs. 1-6, and that after the initial depression of the member 14, it is suddenly released causing a shower of sparks which is substantially independent of the operator's control.

Having thus described my invention with particularity, with reference to the preferred embodiments of the same, and having referred to certain modifications thereof, it will be obvious to those skilled in the art, after understanding my invention, that other changes and modifications may be made therein without departing from the spirit or scope of my invention, and it is intended in the appended claims to cover such changes and modifications as are within the scope of the invention.

What I claim is:

1. In a pyrophoric lighter having a sparking wheel, means for actuating said wheel comprising manually movable means, a rigid, tiltable latch pin having a shoulder which in the normal position of said pin is held in the path of said movable means and which in the tilted position of said pin is out of the path of said movable means and means on said movable means engageable with said pin to tilt said pin and to move said shoulder out of said path on movement of said movable means from idle to active positions, and means drivingly interconnecting said first-mentioned means and said wheel.

2. In a pyrophoric lighter having a sparking wheel, means for actuating said wheel comprising a manually movable first member, a second member connected with said first member and movable thereby, means drivingly interconnecting one of said members and said wheel, a rigid latch pin having a shoulder normally held in the path of a portion of one of said members, said shoulder being engageable with said last-mentioned member and preventing movement thereof with said pin its normal position, and means on one of said members spaced from said portion and engageable with said pin to move said shoulder out of said path on movement of said first member from idle to active positions and to thereby permit movement of said member engageable with said shoulder.

3. In a pyrophoric lighter having a sparking wheel, means for actuating said wheel comprising manually movable means, a latch pin having a shoulder normally held in the path of a portion of said movable means and means on said movable means engageable with said pin at a portion thereof spaced from said shoulder to move said shoulder out of said path on movement of said movable means from idle to active positions, and means drivingly interconnecting said first-mentioned means and said wheel.

4. In a pyrophoric lighter having a sparking wheel, means for actuating said wheel comprising a manually movable first member, a second member connected with said first member and movable thereby, means drivingly interconnecting one of said members and said wheel, a latch pin having a shoulder normally held in the path of one of said members, and means on one of said members engageable with said pin at a portion thereof spaced from said shoulder to move said shoulder out of said path on movement of said first member from idle to active positions.

5. In a pyrophoric lighter having a sparking wheel, means for actuating said wheel comprising manually movable means having a hollow plunger secured thereto, means drivingly interconnecting said movable means and said wheel, a latch pin mounted with a portion thereof within said plunger, said pin having a shoulder normally held in the path of movement of said movable means, and means on said movable means engageable with said pin at a portion thereof spaced from said shoulder to move said shoulder out of said path on movement of said movable means from idle to active positions.

6

6. In a pyrophoric lighter having a sparking wheel, means for actuating said wheel comprising a manually movable member, means drivingly interconnecting said member and said wheel, a spring-urged member mounted on said movable member, a latch pin having a shoulder normally held in the path of movement of said spring-urged member, and means on said movable member engageable with said pin to move said shoulder out of said path on movement of said movable member from idle to active positions.

7. A pyrophoric lighter having a casing; a burner, a sparking wheel and a reciprocable fingerpiece mounted on said casing; means interconnecting said fingerpiece and said sparking wheel to move said sparking wheel on movement of said fingerpiece from idle to active positions; a pyrophoric material mounted on said casing in contact with said sparking wheel; a guide tube mounted on a wall of said casing and extending therethrough; a hollow plunger driven by said fingerpiece and slidably engaging the interior wall of said tube; a latch sleeve slidably mounted inside said plunger; spring means urging said fingerpiece away from said sleeve; a latch pin having a shoulder, said shoulder being intermediate said ends of said pin and said pin being mounted within said tube; means normally tilting said pin so that said shoulder is in the path of movement of said sleeve by said fingerpiece; means on said fingerpiece engageable with the end of said pin nearer said fingerpiece and adapted to tilt said pin and to move said shoulder out of the path of said sleeve on movement of said fingerpiece from idle to active positions; and spring means urging said fingerpiece into idle position.

8. A pyrophoric lighter having a casing; a burner, a sparking wheel and a reciprocable fingerpiece mounted on said casing; means interconnecting said fingerpiece and said sparking wheel to move said sparking wheel on movement of said fingerpiece from idle to active positions; a pyrophoric material mounted on said casing in contact with said sparking wheel; a guide tube mounted on a wall of said casing and extending therethrough; a hollow plunger secured to said fingerpiece and slidably engaging the interior wall of said tube; a latch sleeve slidably mounted inside said plunger; spring means urging said fingerpiece away from said sleeve; a latch pin having oppositely slanted ends and having a shoulder, said shoulder being intermediate said ends of said pin and said pin being mounted within said tube and said sleeve with said shoulder engageable with the end of said sleeve remote from said fingerpiece; means on said fingerpiece engageable with the end of said pin nearer said fingerpiece and adapted to tilt said pin on movement of said fingerpiece from idle to active positions; means on said tube engageable with the end of said pin remote from said fingerpiece; and spring means urging said pin away from said fingerpiece.

9. A pyrophoric lighter having a casing; a burner, a sparking wheel and a reciprocable fingerpiece mounted on said casing; means interconnecting said fingerpiece and said sparking wheel to move said sparking wheel on movement of said fingerpiece from idle to active positions; a pyrophoric material mounted on said casing in contact with said sparking wheel; a guide cylinder mounted on a wall of said casing and extending therethrough; a hollow plunger secured to said fingerpiece and slidably engaging the interior wall of said cylinder; a latch sleeve slidably mounted inside said plunger; spring means urging said fingerpiece away from said sleeve; a latch pin having oppositely slanted ends and having a shoulder, said shoulder being intermediate said ends of said pin and said pin being mounted within said cylinder and said sleeve with said shoulder engageable with the end of said sleeve remote from said fingerpiece; means on said fingerpiece engageable with the end of said pin nearer said fingerpiece and adapted to tilt said pin on movement of said fingerpiece from idle to active positions; means on said cylinder engageable with the end of

said pin remote from said fingerpiece; and spring means urging said pin away from said fingerpiece.

10. A pyrophoric lighter having a casing; a burner, a sparking wheel and a reciprocable fingerpiece mounted on said casing; a cap pivotally mounted on said casing and movable between burner-covering and burner-exposing positions; gear means interconnecting said fingerpiece and said cap to move said cap from burner-covering to burner-exposing positions on movement of said fingerpiece from idle to active positions; pawl means interconnecting said cap and said sparking wheel to move said sparking wheel on movement of said cap from burner-covering to burner-exposing positions; a pyrophoric material mounted on said casing in contact with said sparking wheel; a guide cylinder having an open end and a closed end, said cylinder being mounted on a wall of said casing and extending therethrough with said closed end within said casing; a hollow plunger secured to said fingerpiece and slidably engaging the interior wall of said cylinder, said plunger having an inwardly-extending, annular shoulder at the end thereof remote from said fingerpiece; a latch sleeve slidably mounted inside said plunger and engageable with said shoulder; a spring mounted inside said plunger between said fingerpiece and said sleeve; a cylindrical latch pin having a conical end and having an opposite end lying in a plane intersecting the axis of said pin at an acute angle and further having a pair of shoulders, one of said pair of shoulders being adjacent said opposite end of said pin and the other of said pair of shoulders being intermediate said one shoulder and said conical end, said pin being mounted within said cylinder and said sleeve with said opposite end of said pin abutting said closed end of said cylinder and with said other shoulder engageable with the end of said sleeve remote from said spring and said fingerpiece having an aperture therein adapted to receive said conical end and to tilt said pin on movement of said fingerpiece from idle to active positions, the portion of said fingerpiece surrounding said aperture being engageable with said conical end; and a spring mounted within said cylinder between said one shoulder of said pin and said annular shoulder on said plunger.

11. In a pyrophoric lighter having a spark-producing member, means for actuating said member comprising manually movable means, a rigid, tiltable latch pin having a shoulder which in the normal position of said pin is held in the path of a portion of said manually movable means and which in the tilted position of said pin is out of the path of said portion of said movable means and means on said manually movable means spaced from said portion and engageable with said pin to tilt said pin and to move said shoulder out of said path on movement of said portion of said manually movable means from idle to active positions, and means drivingly interconnecting said first-mentioned means and said spark-producing member.

12. A pyrophoric lighter having a casing; a burner, a sparking wheel and a reciprocable fingerpiece mounted on said casing; means interconnecting said fingerpiece and said sparking wheel to move said sparking wheel on movement of said fingerpiece from idle to active positions; a pyrophoric material mounted on said casing in contact with said sparking wheel; a guide tube mounted on a wall of said casing and extending therethrough; a hollow plunger secured to said fingerpiece and slidably engaging the interior wall of said tube; a latch sleeve slidably mounted inside said plunger; spring means urging said fingerpiece away from said sleeve; a latch pin having a tapered shoulder, said shoulder being intermediate said ends of said pin and said pin being mounted within said tube; means normally tilting said pin so that an end of said pin is in the path of movement of said sleeve by said fingerpiece; means on said fingerpiece engageable

with said shoulder on said pin and adapted to tilt said pin and to move said end out of the path of said sleeve on movement of said fingerpiece from idle to active positions; and spring means urging said fingerpiece into idle position.

13. A pyrophoric lighter having a casing; a burner, a sparking wheel and a reciprocable fingerpiece mounted on said casing; means interconnecting said fingerpiece and said sparking wheel to move said sparking wheel on movement of said fingerpiece from idle to active positions; a pyrophoric material mounted on said casing in contact with said sparking wheel; a guide tube mounted on a wall of said casing and extending therethrough; a hollow plunger secured to said fingerpiece and slidably engaging the interior wall of said tube; a latch sleeve slidably mounted inside said plunger and having a shoulder; spring means urging said fingerpiece away from said sleeve; a latch pin having a slanted end and having a tapered shoulder, said shoulder being intermediate the ends of said pin and said pin being mounted within said tube and said sleeve with the end thereof opposite from said slanted end engageable with said shoulder of said sleeve; means on said fingerpiece engageable with said shoulder on said pin and adapted to tilt said pin on movement of said fingerpiece from idle to active positions; means on said tube engageable with said slanted end of said pin; and spring means urging said pin away from said fingerpiece.

14. A pyrophoric lighter having a casing; a burner, a sparking wheel and a reciprocable fingerpiece mounted on said casing; a cap pivotally mounted on said casing and movable between burner-covering and burner-exposing positions; gear means interconnecting said fingerpiece and said cap to move said cap from burner-covering to burner-exposing positions on movement of said fingerpiece from idle to active positions; pawl means interconnecting said cap and said sparking wheel to move said sparking wheel on movement of said cap from burner-covering to burner-exposing positions; a pyrophoric material mounted on said casing in contact with said sparking wheel; a guide cylinder having an open end and a closed end, said cylinder being mounted on a wall of said casing and extending therethrough with said closed end within said casing; a hollow plunger secured to said fingerpiece and slidably engaging the interior wall of said cylinder, said plunger having an inwardly-extending, tapered, annular shoulder at the end thereof remote from said fingerpiece; a latch sleeve slidably mounted inside said plunger and having a shoulder at the end thereof nearer said fingerpiece; a spring mounted inside said plunger between said fingerpiece and said sleeve; a cylindrical latch pin having a first end and having an opposite end lying in a plane intersecting the axis of said pin at an acute angle and further having a pair of shoulders, one of said pair of shoulders being adjacent said opposite end of said pin and the other of said pair of shoulders being tapered and intermediate said one shoulder and said first end, said pin being mounted within said cylinder and said sleeve with said opposite end of said pin abutting said closed end of said cylinder and with said first end engageable with said shoulder of said sleeve and said shoulder on said plunger being engageable with said other shoulder on said pin to tilt said pin on movement of said fingerpiece from idle to active positions; and a spring mounted within said cylinder between said one shoulder of said pin and said annular shoulder on said plunger.

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