

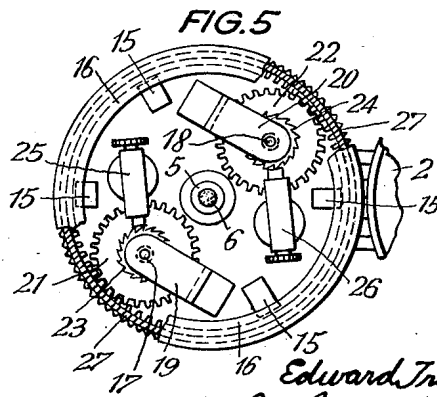
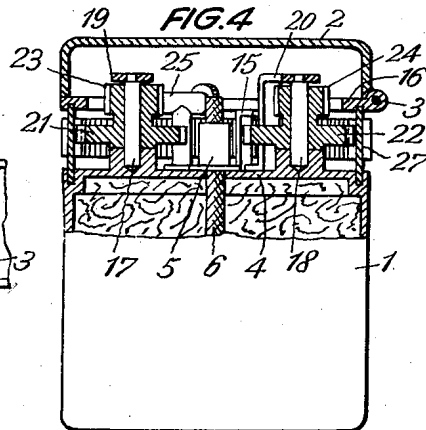
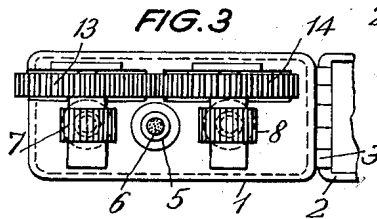
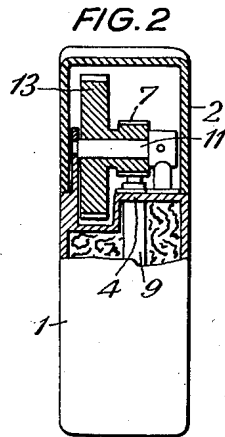
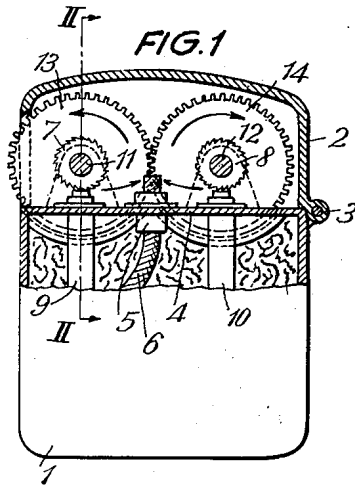
July 11, 1950

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LIGHTER

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3 Sheets-Sheet 1



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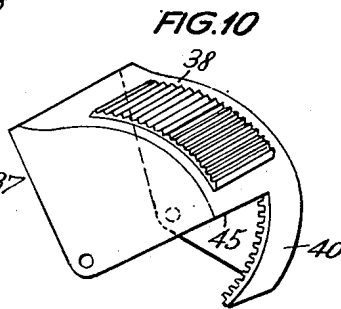
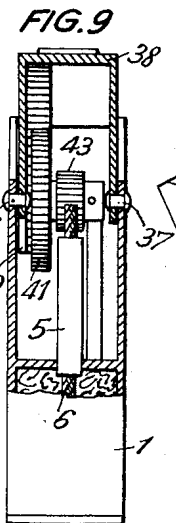
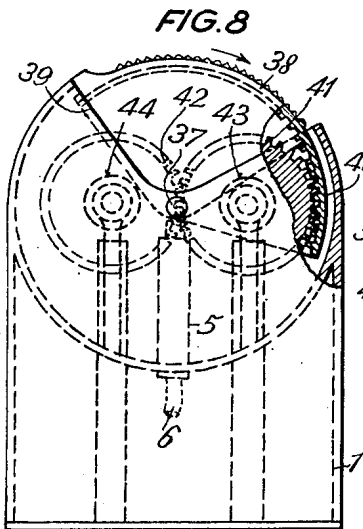
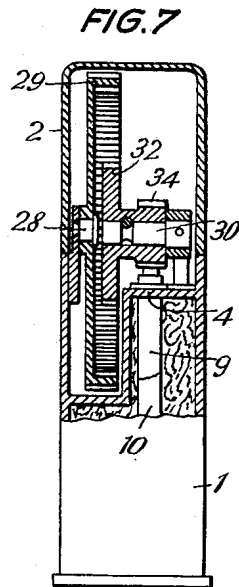
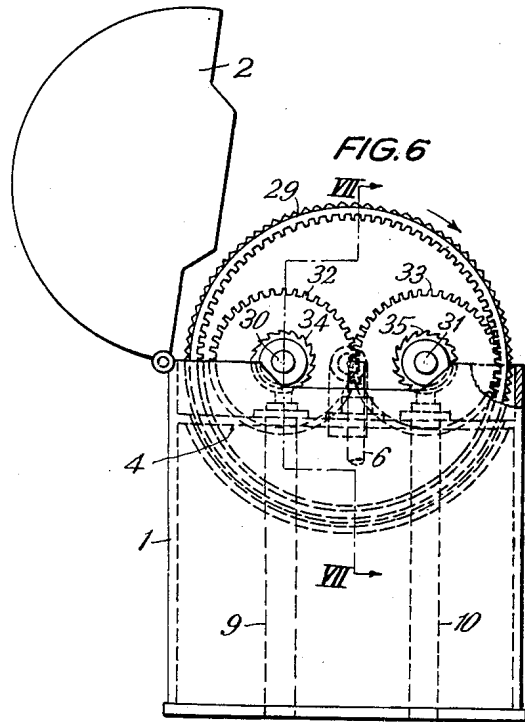
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3 Sheets-Sheet 2



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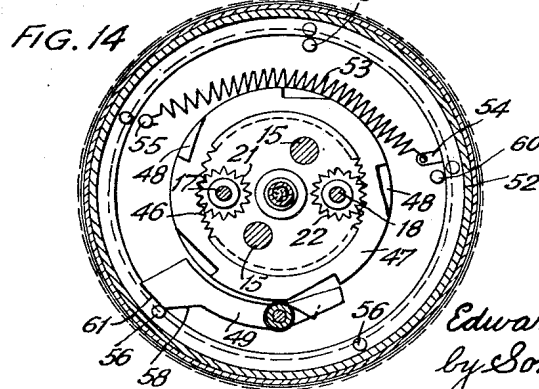
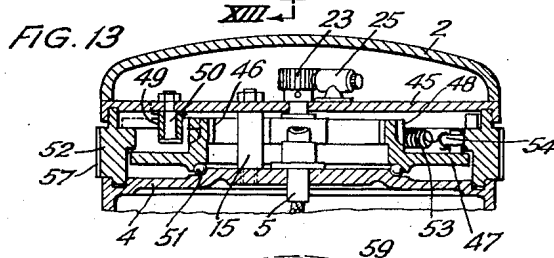
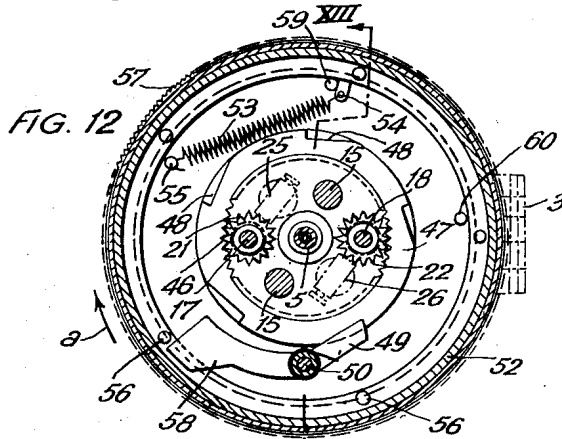
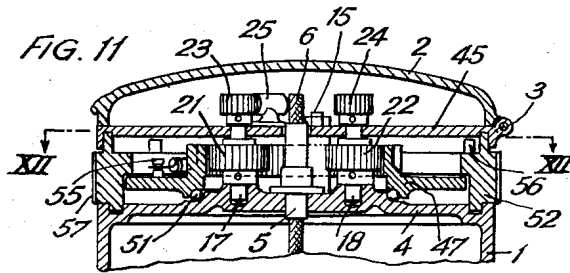
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3 Sheets-Sheet 3



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# UNITED STATES PATENT OFFICE

2,514,709

LIGHTER

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2 Claims. (Cl. 67-7.1)

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This invention relates to pyrophoric lighters and more particularly to multiple ignition lighters, comprising two or more sparking wheels for the production of ignition sparks.

It is an object of the invention to provide a simple and at the same time a reliable operation of the lighter by coupling the different sparking wheels with each other by means of gearing and operating them simultaneously by a single actuation member, while the sparking wheels are so disposed relatively to the wick that ignition sparks are projected from at least two opposite sides towards the wick. The disposition can be conveniently so that each sparking wheel is rigidly connected with a gear wheel. The two gear wheels can mesh with each other, one of the gear wheels being then formed by example as finger wheel for actuating the sparking wheels, or a separate gear wheel formed as finger wheel can mesh with one of the gear wheels connected with the sparking wheels; when the two gear wheels of the sparking wheels do not directly mesh with each other, they can both mesh by example with a driving ring having internal teeth; the actuation member can be formed by the slidably or rotatably disposed cover of the fuel receptacle, this cover being provided with teeth meshing with one of the gear wheels of the sparking wheels, so that when opening the cover the sparking wheels are actuated and sparks produced.

A further object of the invention is the provision of a spring detent between the actuating member and the sparking wheels so as to impart to all sparking wheels a rotation by a sudden impulse on release of the detent.

The accompanying drawings represent by way of example and diagrammatically several embodiments of the present invention.

Fig. 1 shows a lighter according to the invention in lateral elevation, partially in section.

Fig. 2 is a section along the line II—II of Fig. 1.

Fig. 3 is a plan view of the lighter with the cover in open position.

Fig. 4 represents a modification in elevation and partially in section.

Fig. 5 is a plan view of this modified lighter with the cover in open position.

Fig. 6 shows a further modification of the lighter according to the invention with the cover of the receptacle in open position.

Fig. 7 is a section along the line VII—VII of Fig. 6 with the cover in closed position.

Fig. 8 is a side view of a further modification.

Fig. 9 is a fragmentary vertical section through this modification.

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Fig. 10 is a perspective view of the cover of this lighter.

Fig. 11 is a fragmentary axial section of another construction of a lighter according to the invention.

Fig. 12 is a section along the line XII—XII of Fig. 11.

Fig. 13 is a vertical section along the line XIII—XIII of Fig. 12.

Fig. 14 is a section similar to that of Fig. 12 but showing the parts in another position of operation.

The lighter represented in Figs. 1 to 3 comprises a receptacle 1 forming the fuel container and having a cover 2 pivotally fixed thereto by means of a hinge 3. The casing top wall 4 carries a guide tube 5 through which emerges the wick 6. The mechanism for the production of ignition sparks comprises two sparking wheels 7 and 8 against each of which a flint stone is pressed from below. The flints are guided in the two flint tubes 9 and 10 and applied against the sparking wheels in known manner by a not represented spring. The sparking wheels 7 and 8 are rotatably mounted each on an axis 11 and 12, respectively, carried by the casing top wall 4, and are rigidly connected each with a gear wheel 13 and 14, respectively, rotatable on each axis 11 and 12. The two wheels 13 and 14 mesh with each other, so that upon rotation of one wheel the other wheel rotates in opposite direction. The gear wheel 13 is used as finger wheel for actuating the sparking mechanism. Its toothed rim penetrates through a slot in the front wall of the cover 2 and projects beyond the front wall of the receptacle 1 as shown in Fig. 1, so that it can be rotated, when the cover 2 is opened, by actuation with the thumb of the hand holding the lighter, in the direction of the represented arrow. Upon rotation of the wheel 13 also the wheel 14 is turned in the direction of the represented arrow. The two sparking wheels 7 and 8 turn together with the gear wheels 13 and 14 and produce ignition sparks, which are projected from opposite directions towards the wick 6 and ignite the latter.

In the modification according to Figs. 4 and 5 the lighter receptacle 1 of cylindrical shape comprises a top wall 4 carrying an annular support 16 by means of props 15 provided with the hinge 3 for the cover 2. The top wall 4 of the receptacle carries two vertical axes 17 and 18 mounted equidistant and radially from the center of the receptacle and guided by their upper ends in brackets 19 and 20. Each of these axes carries a gear wheel 21 and 22, respectively, each

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of which is rigidly connected with a sparking wheel 23 and 24, respectively. The top wall 4 of the receptacle also carries two flint tubes 25 and 26, in each of which is lodged a spring, not shown, which presses the flint against the corresponding friction wheel.

An annular actuating member 27 is rotatably mounted between the top wall 4 of the receptacle and the support 16 and provided with internal teeth which mesh with the two gear wheels 21 and 22, while the outer face of the ring 27 is milled. The wick 6 of the lighter emerges from the wick guide 5 in the center of the top wall 4 of the receptacle between the two sparking wheels 23 and 24.

For using this lighter the cover 2 is opened. Then the actuating ring 27 can be turned with the thumb of the hand holding the lighter, whereby owing to the internal teeth of the ring 27 meshing with the two gear wheels 21, 22, these gear wheels are also rotated. Since the flints in the tubes 25 and 26 are pressed from opposite sides against the two sparking wheels 23 and 24, ignition sparks are projected from opposite directions towards the center to the wick 6 and ensure a reliable ignition of the wick.

In the modification according to Figs. 6 and 7 the cover 2 is hingedly connected to the receptacle 1. The cover 2 can be formed by example as spring cover. A wheel 29 with internal teeth is rotatably mounted on a pin 28 carried by the wall of the receptacle. Pinions 32 and 33, respectively, are rotatably mounted on axes 30 and 31 parallel with the pin 28; the two pinions mesh with each other and the pinion 33 also meshes with the internal teeth of the wheel 29. Each pinion 32 and 33 is rigidly connected with a sparking wheel 34 and 35, respectively. Flint stones guided in flint tubes 9 and 10 are pressed from below against the two sparking wheels. The end of the wick 6 to be ignited is situated in the middle between the two sparking wheels 34 and 35.

For using the lighter the thumb of the hand holding the receptacle after opening the cover 2, is placed against the milled external surface of the gear wheel 29 and a rotation is imparted to this latter in the direction of the represented arrow. The two pinions 32 and 33 with the sparking wheels 34 and 35 are then rotated in opposed directions relatively to each other and ignition sparks are projected from both sides towards the wick 6. For turning the driving wheel 29 the spring cover 2 could also be operatively connected in known manner with this wheel, so that upon opening of the cover the wheel is turned and sparks are produced.

In the example according to Figs. 8, 9 and 10 the cover itself of the lighter serves as actuation member for the sparking wheels. The cover 38 having the shape of a cylindrical sector is rotatably mounted on axes 36 and 37 at the side walls of the receptacle and fuel container 1, and normally closes the sector-shaped opening 39 in the receptacle. A curved gear rack 40 is provided on the inside of the cover 38 along a side wall thereof and extends beyond one edge 45 of the cover, in order to mesh with a pinion 41. The pinion 41 and the pinion 42 meshing with it are rotatably mounted on the side walls of the casing and rigidly connected each with a sparking wheel 43 and 44. Flint stones guided in each flint tube are applied from below against the sparking wheel. The wick 6 is situated in the middle between the two sparking wheels.

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For using the lighter, the cover 38 having a milled external surface, is displaced with the finger of one hand in the direction of the represented arrow, whereby the rack teeth 40 of the cover cause rotation of the pinions 41 and 42 and of the sparking wheels 43 and 44 connected with them, and ignition sparks are projected from opposite sides towards the wick 6. Since the rack 40 of the cover is situated laterally of the wick guide 5 and the flint tubes, the rack can pass beyond these tubes and the wick guide, while the edge 45 of the cover limits the opening movement of the latter by abutting against the flint tube 10. Closing of the cover could also be obtained by spring pressure, or the cover could be under spring tension in the closed position and automatically open when it is released to produce ignition sparks.

The modified lighter according to Figs. 11 to 14 comprises a cylindrical receptacle 1 which forms the fuel container, and a cover 2 adapted to stand upwardly. The cover 2 is pivotally connected by means of a hinge 3 to the upper end wall 45 of the receptacle carried by props 15 on the top wall 4. The wick 6 passes through the top wall 4 and the wall 45 by means of a wick guide 5 situated in the axis of the cylindrical receptacle 1. On both sides of the wick 6 at diametrically opposed points are disposed two sparking wheels 23 and 24, respectively. The axes 17 and 18 of these friction wheels penetrate through the wall 45 and are mounted in the top wall 4 of the receptacle 1. The axis 17 carries a pinion 21 and the axis 18 a pinion 22. The two pinions 21 and 22 are in mesh with the internal gear 46 of a ratchet disc 47. This latter is provided with a number of notches 48 which cooperate with a spring pawl 49. The pawl 49 is pivotally mounted by means of a pin 50 on the fixed wall 45. The ratchet disc 47 is mounted by the intermediary of balls 51 on the top wall 4 to be easily rotatable about the central axis of the receptacle 1.

An annular actuating member 52 is rotatably mounted between the walls 4 and 45. A coiled spring 53 is fixed with one end to a pin 54 of the actuating member 52 and with the other end at pin 55 to the ratchet disc 47. The upper end face of the driving ring 52 carries a number of pins 56 equally spaced in circumferential direction.

For using the lighter the cover 2 is opened and the actuating ring 52 is turned in the direction of the represented arrow *a* in Fig. 12. The external face of the ring 52 can be provided with a milling 57 to be more easily gripped. The ratchet disc 47 is maintained against rotation by the pawl 49, so that the coiled spring 53 is tensioned, as is represented in Fig. 14. After a certain angular displacement of the ring 52 one of the pins 56 carried thereby abuts against the inclined edge 58 of the pawl 49 and causes this pawl to pivot about its axis 50 and to release the ratchet disc 47 (Fig. 14). The energy accumulated by the tensioned spring 53 is suddenly liberated and causes the ratchet disc 47 to spring also in the direction of the arrow *a* until a pin 59 of the ratchet disc abuts against the pin 54 of the driving ring 52. The inclined edge 58 abandons the pin 56 and the pawl 49 engages into the next following notch 48 of the ratchet disc 47 and again maintains this latter. The quick movement of rotation of the ratchet disc 47 after its release by raising the pawl 49 is transmitted by its internal teeth 46 to both pinions 21 and 22 and to

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the sparking wheels 23 and 24 rigidly connected with them. Flint stones contained in the flint tubes 25 and 26 are pressed against the sparking wheels which turn in the direction of the hands of a clock in Fig. 12 and owing to the suddenly released quick movement they produce ignition sparks already with a relatively weak pressure of the flints, the sparks being projected from opposed sides towards the wick and ignite this latter.

It can happen, for example when new flint stones have been introduced into the flint tube 25 and 26, and the spring by which they are pressed against the sparking wheels is tensioned too much, that a rotation of the sparking wheels 23 and 24 requires a considerable power, particularly as long as the ends of the flints have not been ground down by the sparking wheels. In such a case it could happen that after moving the actuating ring 52 and in spite of the raised pawl 49 and released ratchet disc 47, this latter does not spring but remains locked owing to the pressure of the flints and accordingly the lighter does not operate. For this reason the ratchet disc 47 is provided with an abutment pin 60, which is situated in the path of the pin 54 of the actuating ring 52 and so disposed relatively to this pin 54 that normally the pawl 49 is disengaged from the ratchet disc by the pin 56, before the pin 60 is reached by the pin 54, as shown in Fig. 14. When, however, the ratchet disc 47 is locked, the pin 54 bears against the pin 60 before the pin 56, which then slides along the edge 61 of the pawl 49, releases the pawl. When continuing the rotation of the ring 52, the ratchet disc is positively driven by the pin 54 of the ring 52 and transmits by means of its internal teeth 46 a corresponding movement of rotation to the sparking wheels 23 and 24. When the pin 56 of the actuating ring 52 has passed the edge 61 of the pawl 49, the pawl is free and can engage the next-following notch 48 of the ratchet disc 47, but it is at once disengaged again by the next following pin 56. The ratchet disc 47 accordingly can be continuously turned by actuating the ring 52 until the flint stones are ground down by the sparking wheels 23 and 24 and the force of the spring 53 suffices to cause the lighter to operate normally, the tensioned spring 53 causing the pawl disc to spring, or until the person operating the lighter will be aware that the ratchet disc 47 does not spring, and then will remove the resistance between the

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flint stone and the friction wheel in another manner.

I claim:

1. A pyrophoric lighter having a cylindrical receptacle, a wick emerging from the receptacle in the central axis thereof, a ratchet disc rotatable about the axis of the receptacle, said ratchet disc having internal gear teeth and external ratchet notches, a pawl cooperating with said notches, an annular actuating member rotatable about the axis of the receptacle, a coiled spring having one end attached to said ratchet disc and the other end to said actuating member so as to be tensioned upon relative angular movement between the ratchet disc and the actuating member, a pinion in mesh with the internal gear teeth of said ratchet disc, a sparking wheel connected to said pinion, and a series of pins on said actuating member corresponding each to one of said notches on the ratchet disc, said pawl projecting into the circular path of said pins, whereby said pawl is disengaged from the ratchet disc after an angular movement of the actuating member and the ratchet disc suddenly rotated by the action of said spring.

2. A pyrophoric lighter as claimed in claim 1, wherein said actuating member and said ratchet disc comprise cooperating abutments disposed so that after an angular movement of the actuating member greater than the angular movement required to disengage said pawl from the ratchet disc the abutment on the actuating member bears against the abutment on the ratchet disc to positively drive said disc.

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