

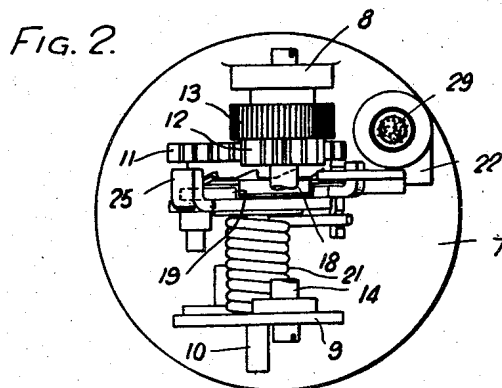
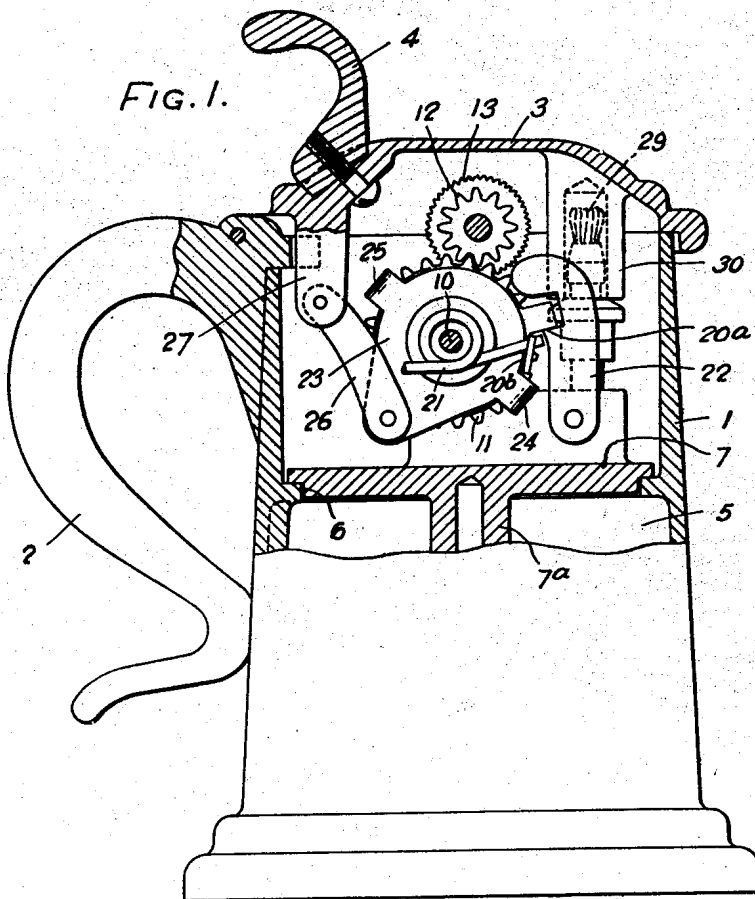
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H. C. H. SMYTH
PYROPHORIC LIGHTER

2,652,706

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2 Sheets-Sheet 1



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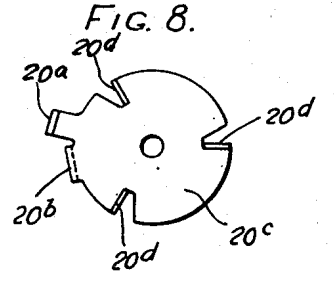
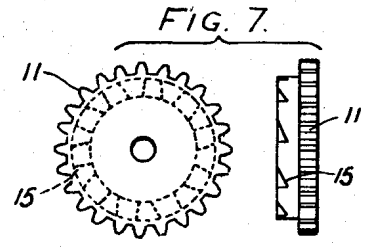
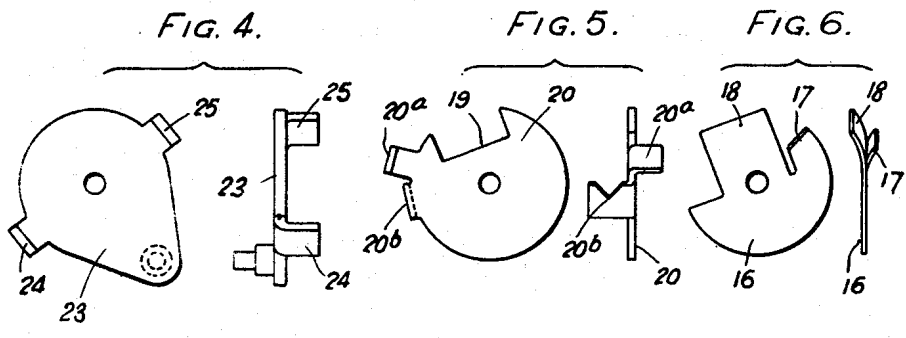
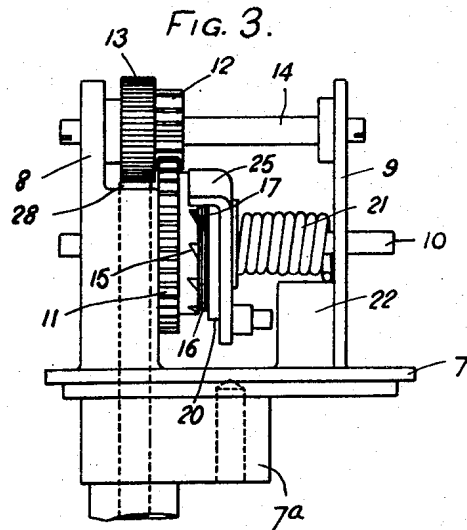
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UNITED STATES PATENT OFFICE

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PYROPHORIC LIGHTER

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This invention relates to pyrophoric lighters of the pocket and/or table type. More especially the invention relates to operating mechanism for such lighters of the kind including spring-actuated means for effecting the rotation of the flint wheel to produce sparks to ignite the wick.

It is an object of the present invention to provide an improved form of mechanism of this kind.

According to the present invention operating mechanism for a pyrophoric lighter comprises a rotatably mounted driving member adapted to be rotated in one direction by a spring, gearing connecting said member with a rotatable flint wheel whereby rotation of said driving member produces a rotation of the flint wheel at a relatively higher speed, a latch device for holding said rotatably mounted member in preset position with its actuating spring in loaded condition and a manually operable control member so arranged that on movement in one direction it rotates the driving member against the action of the actuating spring until it is automatically engaged by the said latch, and on movement in the opposite direction the control member releases the latch to free the driving member to be rotated by its spring to effect the rotation of the gearing to rotate the flint wheel and produce a spark.

To enable the invention to be fully understood it will now be described with reference to the accompanying drawings, in which:

Fig. 1 is a front view of a lighter partly in section, embodying one form of the invention;

Fig. 2 is a plan view of the operating mechanism shown in Fig. 1, but with the lighter casing removed;

Fig. 3 is a side view of the operating mechanism shown in Fig. 2;

Fig. 4 shows front and side views of the control or actuating plate;

Fig. 5 shows front and side views of the driving plate;

Fig. 6 shows front and side views of the clutch disc,

Fig. 7 shows front and side views of the gear wheel, and

Fig. 8 shows a modified form of driving member.

As shown in the accompanying drawings a table lighter comprises a body portion 1 having a handle 2 and a pivoted lid 3 adapted to be raised by manual pressure on a thumb-piece 4.

The lower portion 5 of the body is adapted to serve as a fuel reservoir and is adapted to

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be filled with fuel absorbent material in known manner. The body 1 is formed with an annular flange 6 which supports a plate 7 on which the lighter operating mechanism is mounted. The base plate 7 is also adapted to form the top or cover for the reservoir 5, the bottom of which is formed by a detachable base (not shown) of the body 1. The plate 7 and base of the body are secured in a gas-tight manner to the body by a screw adapted to extend through the base of the body 1 and screw into the screw-threaded hole 7a on the plate 7 whereby by tightening up the screw the top and bottom members of the reservoir 5 will be drawn tightly on to suitable flanged seats on the body.

Spaced side plates 8, 9 are provided projecting upwardly of the plate 7, the ends of a shaft 10 being journaled in these side plates. A gear wheel 11 is freely rotatably mounted on the shaft 10 adjacent to the plate 8, the gear wheel meshing with a small diameter pinion 12 which is rigidly secured to the flint wheel 13, the pinion 12 and flint wheel being freely mounted for coaxial rotation on the spindle 14 which is journaled in the side plates.

The side face of the gear wheel 11 remote from the side plate 8 is formed with ratchet teeth 15. A sheet metal disc 16 is rotatably mounted on the shaft 10 and includes a resilient tongue 17 adapted to engage the ratchet teeth 15 and a lug 18 bent to project from the opposite side of the disc to the tongue and engageable in a recess 19 in a driving plate 20 which is rotatable on the shaft 10. Accordingly the disc 16 forms a one-way clutch device whereby when the plate 20 is rotated in an anti-clockwise direction, as viewed in Fig. 1, it will carry the disc 16 round with it and the tongue 17 will engage the ratchet teeth and rotate the gear 11, but when rotated in an anti-clockwise direction the tongue 17 will ride over the ratchet teeth by reason of the resilient nature of the tongue.

The driving plate 20 is provided with lugs 20a, 20b projecting from opposite sides, the lug 20b engaging the end of a coil spring 21 whose opposite end rests on a shoulder 22 (Fig. 3) whereby the spring tends to rotate the driving plate 20 in a clockwise direction as viewed in Fig. 1.

The lug 20a is adapted to be engaged by a pivoted spring latch 22 when the driving plate is in the preset position with the spring in loaded condition, as shown more particularly in Figs. 1 and 2.

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An actuating or control plate 23 is freely rotatable on the shaft 10 and is provided with lugs 24, 25 projecting from opposite sides thereof. The lug 24 is adapted to engage the lug 20b for the purpose of rotating the driving plate into preset position when the plate 23 is rotated in an anti-clockwise direction and the lug 25 being adapted, when the plate 23 is rotated in a clockwise direction to engage and displace the latch 22 to release the driving plate 20 to be rotated by the spring 21.

The plate 23 is connected by a pivoted link 26 to a depending portion 27 on the lid 3.

In the position shown in Figs. 1 and 2 the mechanism is in preset condition with the spring 21 stressed. The spring cannot however rotate the driving plate 20 as the lug 20a of this plate is engaged by the notch in the spring latch 22 (see Fig. 1).

The operation of the lighter is as follows:

The lid 3 is raised by pressing on the thumb-piece 4. As the lid rises the depending portion 27 of the lid pulls the link 26 which is pivoted to the control plate 23 and rotates the latter about the shaft 10 in a clockwise direction. When the lid approaches fully raised position, the control plate 23 will have been rotated to such an extent that the lug 25 thereon will engage the latch 22 and move it to the right (as shown in Fig. 1) to disengage its notched portion from under the lug 20a. The driving plate 20 is now free to be rotated by the loaded spring 21 whose end bears on the lug 20b of the said driving plate 20. It will be understood that as the snuffer or wick cover 30 is integral with the lid, the wick 29 is fully exposed when the lid 3 is raised.

When the driving plate 20 is rotated by the spring 21, it carries round with it the clutch disc 16, whose lug 18 extends into the recess 19 of the plate 20. The resilient tongue 17 of the clutch disc 16 engages the ratchet teeth 15 on the gear wheel 11 and rotates the latter. As the pinion 12 is much smaller in diameter than the gear wheel 11 with which it meshes, the pinion will be rapidly rotated when the gear wheel 11 is rotated to produce a rapid rotation of the friction wheel 13 and an efficient spark to ignite the wick 29.

The closing of the lid 3 resets the mechanism and reloads the spring 21, the operation of re-setting being as follows:

As the lid is closed the link 26 is moved to rotate the control plate 23 in an opposite direction, that is to say in an anti-clockwise direction. As the plate 23 is rotated its lug 24 picks up the lug 20b on the driving plate 20, and rotates the latter against the action of the spring 21. During rotation of the plate 20, the lug 20a displaces the pivoted latch 22 until the notch on the latter, urged by a suitable spring, snaps beneath the lug 20a whereby the plate 20 is held in preset position wherein the spring 21 is loaded but is prevented from rotating the plate 20 by the latch 22. The mechanism remains in this position until the latch is released by the reverse rotation i. e. clockwise rotation of the control plate 23, to move the lug 25 to engage with and displace the latch.

It will be noted that rotation of the control member 23 in one direction loads the spring, pre-sets the mechanism and latches it, and that movement of the control member in an opposite direction releases the latch, so as to free the mechanism to be actuated by the loaded spring. During the anti-clockwise rotation of the plate

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20 during the re-setting of the mechanism, the clutch is also rotated in this direction but the resilient tongue rides over the ratchet teeth 15 without rotating the gear wheel 11.

It will be noted that the gear wheel 11, driving plate 20, actuating or control plate 23 and the clutch plate 16 are all freely mounted on the same shaft 10 and as, when assembled in the lighter body, the ends of the shaft can be shrouded by parts of the body 1 of the lighter, the shaft can be a loose fit in the plates 8, 9. Accordingly the parts of the mechanism are easily assembled by unskilled labour, thereby lessening the cost of production.

In an alternative arrangement the clutch disc 16 may be omitted and the driving plate 20c (Fig. 8) formed with a series of ratchet teeth 20d adapted to engage with the ratchet teeth 15 on the gear wheel 11. In this arrangement the spring 21 would not be so tightly coiled but the adjacent coils would be spaced to permit the plate 20c to move axially to the right in Fig. 3 against the force of the spring 21. Accordingly, the spring 21 would serve to urge the plate 20c towards the gear wheel 11 to hold the ratchet teeth 20d in mesh for driving the gear wheel teeth 15 but would allow the plate 20c to move axially away from the gear wheel 11, to permit the teeth 20d on the plate 20c to ride over the teeth 15 on the gear wheel 11 when the plate 20c is rotated in the opposite or non-driving direction.

Instead of the control plate 23 being rotated by the pivoted lid 3, it may be adapted to be rotated in one direction to load the spring and in the opposite direction to release the latch 22 by a lever, plunger, slide or like means operable by hand from the outside of the lighter body.

The provision of the large diameter gear wheel 11 permits a rapid rotation of the flint wheel 13 to be obtained to produce an efficient sparking effect. The gear ratio of the gear wheel to the pinion on the flint wheel may be 2:1 or more as desired.

The lid 3 is provided with a snuffer 30 adapted to extinguish and cover the wick when the lid is closed and further a light spring catch may be provided to hold the lid in closed position.

I claim:

1. In a lighter, a casing provided with a fuel container, a wick, and a friction wheel for igniting said wick, mechanism for rotating said friction wheel comprising a rotatably mounted driving plate having lugs projecting from opposite side faces thereof, a control plate rotatable coaxially with respect to said driving plate, spring means engageable with the driving plate for rotating the same in one direction, a latch device engageable with one of said driving plate lugs for holding said driving plate stationary in preset position with the said spring in loaded condition, manually operable means for rotating said control plate in two oppositely disposed directions, means on the control plate engageable with the other of said driving plate lugs when the control plate is rotated in one direction, to effect simultaneous rotation of said driving plate against the action of the said spring, to engage the first mentioned lugs on the driving plate with the latch device, and additional means on said control plate adapted to engage and release said latch device from said lug when said control plate is rotated in an opposite direction.

2. In a lighter, a casing provided with a fuel container, a wick and a friction wheel for ignit-

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ing said wick, mechanism for rotating said friction wheel comprising a rotatably mounted driving plate, spring means for rotating said driving plate, a latch device for holding said driving plate against rotation by its spring, a control plate mounted for rotation co-axially with respect to said driving plate, manually operable means for rotating said control plate in two opposite directions, means on said control plate engageable with said driving plate to effect simultaneous rotation of the latter against the action of the spring into a position wherein it is engaged by said latch device when the said control plate is rotated in one direction, and additional means on said control member operative when the latter is rotated in an opposite direction to effect the release of said latch to free the driving member to be rotated by its spring to effect the rotation of the friction wheel to produce a spark.

3. In a lighter having a rotatably mounted friction wheel means for rotating said friction wheel comprising a rotatable driving member, spring means for rotating said driving member, gearing operatively connecting said friction wheel with said driving member, a control plate

mounted for rotation co-axially with respect to said driving member, means on said control plate operable when the latter is rotated in one direction, to effect the rotation of the driving member against the action of the said spring to preset position, latch means for holding said driving member in preset position, additional means on said control plate operable when the latter is rotated in an opposite direction to effect the release of the latch to free the driving member to be rotated by its spring to effect the rotation of the said friction wheel to produce a spark.

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