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2,520,498

PYROPHORIC LIGHTER

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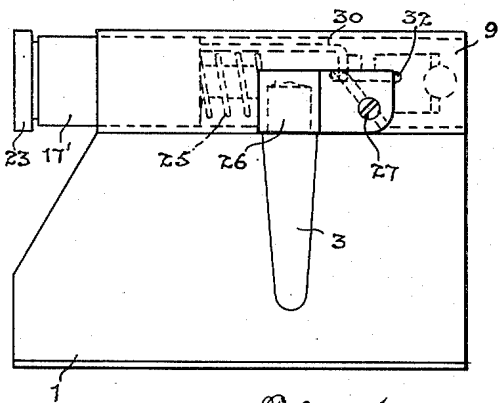


Fig. 1.

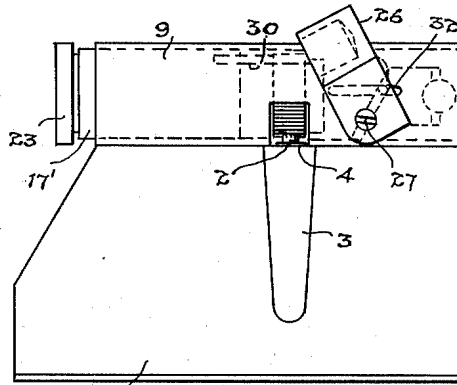


Fig. 2.

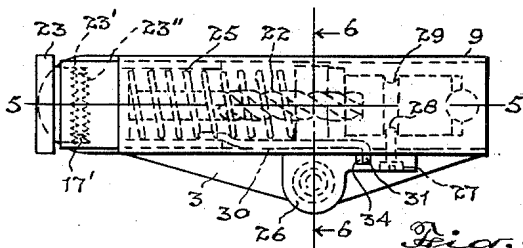


Fig. 3.

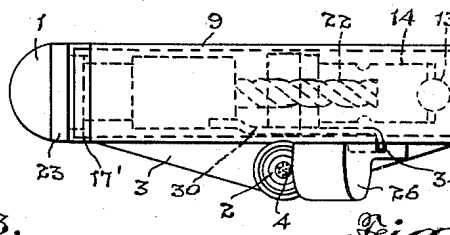


Fig. 4.

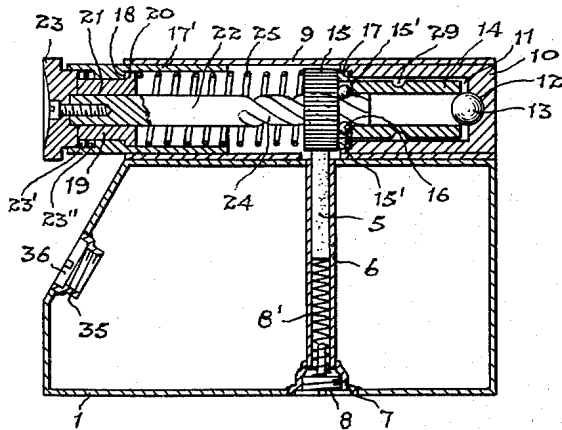


Fig. 5.

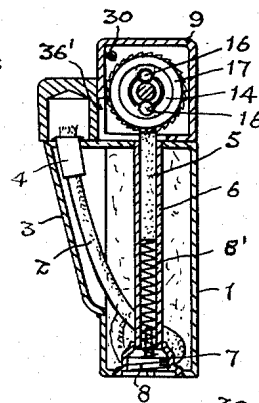


Fig. 6.

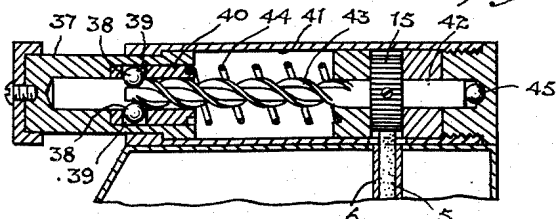


Fig. 8.

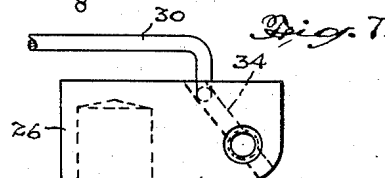


Fig. 7.

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PYROPHORIC LIGHTER

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3 Claims. (Cl. 67-7.1)

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This invention relates to pyrophoric lighters and the principal object of the invention is to provide an extremely reliable pyrophoric lighter which will have a very positive action and can be easily manipulated by the operator with one hand without undue force and without causing rubbing or irritation of the operator's thumb or fingers.

A further important object is to provide a positive acting compact lighter which can be readily carried about the person and which will light under a squeezing action of the thumb and fingers and will be immediately extinguished when released.

A still further object is to provide a lighter of inexpensive and attractive form.

The principal feature of the invention consists in slidably mounting a manually actuated plunger on a fuel chamber from which projects a flint and a fuel wetted wick, arranging an abrasive wheel in axial alignment with the plunger and in position to engage the flint to direct sparks towards the wick, providing a spiral drive between the plunger and wheel to effect rotation thereof upon inward movement of the plunger to ignite the wick and providing a spring to return the plunger to an outward position upon release of pressure.

A further important feature consists in providing a snuffer actuated by the plunger to expose the wick so long as the plunger is pressed in and actuated to snuff the wick when the plunger is released.

With reference to the accompanying drawings, Figure 1 is a side elevational view showing the actuating plunger in retracted position and the snuffer covering the wick.

Figure 2 is a similar view to that of Figure 1 but with the plunger pressed in and the snuffer raised.

Figure 3 is a top plan view showing the device in the position as shown by Figure 1.

Figure 4 is a top plan view similar to that of Figure 3 but showing the plunger at the end of its stroke and the snuffer in raised position to expose the flaming wick.

Figure 5 is a section on line 5-5 of Figure 3.

Figure 6 is a section on line 6-6 of Figure 3.

Figure 7 is a side elevation showing the snuffer and its operating rod.

Figure 8 is a vertical mid-sectional view of an alternative form of lighter embodying my invention.

With reference to the drawings, the lighter includes a box-like casing 1 in which is contained the fuel, and a wick 2 which is housed in a laterally extending chamber 3 formed at the side

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of the casing 1 and emerges from the tank through a collar 4.

The flint 5 is contained in a tube 6 which is placed centrally in the casing or fuel tank and emerges through the top and the base of the casing making leak-proof contact therewith. At the lower end of the tube 6 the base of the casing 1 is provided with a recess 7 to receive a screw-threaded plug 8. The flint in the tube is urged upwardly by a helical spring 8' which is interposed between the flint and the plug 8 at the base of the tube 6.

Secured to the top of the casing 1 and extending longitudinally thereof is a housing 9 in which is inserted an end closure member 10. The member 10 is provided with a cylindrical bore 11 and with a semi-spherical recess 12 in the end wall to receive an end thrust ball bearing 13.

Journalled in the bore 11 of the member 10 is a sleeve 14 to the end of which is integrally attached an annular abrasive wheel 15 arranged above the upper end of the tube 6 to contact the flint 5.

The sleeve 14 is provided with a pair of diametrically opposite orifices 15' extending through the wall thereof adjacent the abrasive wheel to receive each a ball bearing 16. A collar 17 is arranged in the sleeve and engages over the orifices 15' to force the balls 16 to project within the inner sleeve wall.

Slidably arranged in the open end of the housing 9 is a plunger 17' formed with an internal shoulder 18, and arranged in the plunger is a plug 19 having a flange 20 abutting the inner face of the shoulder 18 and formed with a central bore 21.

Rotatably mounted in the bore of the plug 19 and coaxial with the abrasive wheel and sleeve 14 is the operating shaft 22 to which, on its outer end, is secured a circular head 23. The outer face of the head is reduced in thickness toward the centre thereof and has a roughened or serrated surface, and has a reduced diameter on its inner face which is contained within the plunger 17'.

Formed on the inner face of the head 23 is a ratchet surface 23' adapted to engage when the head is pressed inwardly with a ratchet surface 23'' formed on the outer face of the shoulder 18 of the plunger to prevent relative rotation of the plunger and head as the plunger is moved inwardly. The plunger fitting within the rectangular housing 9 is of course estopped from turning.

The operating shaft 22 is provided on the inner end with two helical or spiral grooves 24 arranged on diametrically opposite sides which engage with

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the balls 16 projecting within the sleeve 14 as the shaft operates through the abrasive wheel and in the bore of the sleeve 14 upon actuation of the plunger.

A helical spring 25 is interposed between the flange 20 of the plug 19 and the side face of the abrasive wheel 15.

A snuffer 26 has shown, which covers and uncovers the wick, is mounted for limited rotation on the side of the housing 9 by a screw 27. This screw 27 has a rounded end 28 which slidably engages in a peripheral groove 29 formed in the outer surface of the sleeve 14 and prevents withdrawal of the sleeve.

The snuffer is operated by a rod 30 secured to the plunger 17' and this rod has an offset portion 31 to project through a slot 32 in the housing 9. The laterally turned end 33 of the projecting part of the rod engages in a diagonal slot 34 formed on the inner surface of the snuffer 26. As will be seen, the rod 30 will travel to and fro in the slot 32 formed in the housing 9 and that the length of this slot will determine the travel of the shaft.

Operation.—The device is assembled and lighter fluid placed in the tank through a screw-threaded opening 35 opened and closed by the plug 36. The wick is immersed in the fluid and projects through the collar 4 in the path of sparks from the flint 5 generated by rotation of the abrasive wheel. With the lighter as shown in Figure 1, pressure on the head 23 forces the plunger 17 to move, and the shaft 22 arranged therein to advance through the abrasive wheel 15. With the inward movement of the head the ratchet surfaces 23' and 23'' will engage, preventing relative movement of the head and plunger, and as the shaft 22 is integrally attached to the head, rotation of the shaft will also be prevented. Consequently as the shaft 22 threads through the abrasive wheel the balls 16, which are placed in the sleeve 14 carrying the abrasive wheel, will be forced to travel in the helical grooves 24 formed on the shaft 22 and the sleeve and abrasive wheel will be rotated. Contact of the abrasive wheel with the flint 5 will send a shower of sparks through the opening 36' in the housing 9 and onto the wick which will ignite the fuel contained therein and a flame will result.

Upon movement of the head and plunger the rod 30 will be advanced and, by virtue of its engagement in the diagonal slot 34 in the wall of the snuffer, will cause the snuffer to be rotated on its pivot 27 and the wick will be uncovered. Upon release of the head the ratchet surfaces 23' and 23'' will disengage and the spring 25 will return the head and shaft 22 to its inoperative position, the friction between the wheel and the flint will be sufficient to hold the wheel stationary while the shaft and head will be rotated on the return stroke.

Illustrated in Figure 8 is a modified form of my invention but utilizing the principles evolved above. In this case a plunger 37 carries the balls 38 arranged in diametrically opposite recesses 39 formed in a sleeve 40 inserted in the bore 41 of the plunger. The abrasive wheel 15 is mounted on a shaft 42 which is provided with the spiral grooves 43 corresponding to the grooves 24 and adapted to receive the balls 16. Again inward movement of the plunger forces the balls to travel the spiral grooves 43 of the shaft and as the plunger is held from rotation by frictional engagement with the thumb the shaft and abrasive wheel are rotated.

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As before a spring 44 is utilized to return the plunger, and a ball bearing 45 similar to the ball bearing 13 is utilized to receive the end thrust caused by movement of the plunger.

From the foregoing it will be appreciated that my lighter construction will provide a very positive action to produce a flame. Further, it will be seen that the plunger may be readily operated through a simple squeezing action of the thumb and fingers, enabling the operator to manipulate the lighter with one hand. This squeezing action is important as it provides ample purchase to operate the abrasive wheel without requiring undue force and without rubbing or irritating the hand.

What I claim as my invention is:

1. A pyrophoric lighter, comprising a fuel receptacle, a wick extending from said fuel receptacle, a flint projecting from said fuel receptacle, a housing arranged on said fuel receptacle, a plunger member slidably mounted in said housing and non-rotatable, an abrasive member rotatably mounted in said housing in axial alignment with said plunger and in position to engage said flint to direct sparks towards said wick, an axial extension formed with spiral grooves carried by one of said members, a pair of diametrically opposed balls carried by but held from rotation about the axis of the other of said members and engaging in free rolling contact in said spiral grooves of said extension upon movement of said plunger member axially of said abrasive member, said balls providing a diametrically balanced smooth-rolling action between said members while effecting rotation of said abrasive member upon inward movement of said plunger, an additional ball seated in axial alignment with and receiving the end thrust of said abrasive member to permit free rotation thereof on inward movement of said plunger, spring means urging said plunger outwardly, a snuffer pivotally arranged on said receptacle to cover and uncover said wick, and means operatively connecting said snuffer and said plunger to effect the operation of said snuffer through movement of said plunger.

2. In a pyrophoric lighter, a fuel receptacle, a wick extending from said fuel receptacle, a flint projecting from said fuel receptacle, a housing arranged on said fuel receptacle, a plunger member slidably mounted in said housing, an abrasive member rotatably mounted in said housing and arranged in axial alignment with said plunger and in position to engage said flint to direct sparks toward said wick, an axial extension formed with spiral grooves carried by one of said members, a pair of diametrically opposed balls carried by but held from rotation about the axis of the other of said members and engaging in free rolling contact in said spiral grooves of said extension upon axial movement of said plunger member, said balls providing a smooth rolling action upon said extension relatively moving therebetween while effecting rotation of said abrasive member upon inward movement of said plunger, an additional ball seated in axial alignment with and receiving the end thrust of said abrasive member to permit free rotation thereof on inward movement of said plunger, spring means urging said plunger outwardly, said abrasive member having a peripheral portion former with a peripheral groove, and a pin anchored to said housing and projecting into said groove and maintaining said abrasive member in bearing contact with said end thrust receiving ball.

3. A device as claimed in claim 2 in which said

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pin is an adjustable screw forming an anchoring means positioning said abrasive member in said housing.

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