

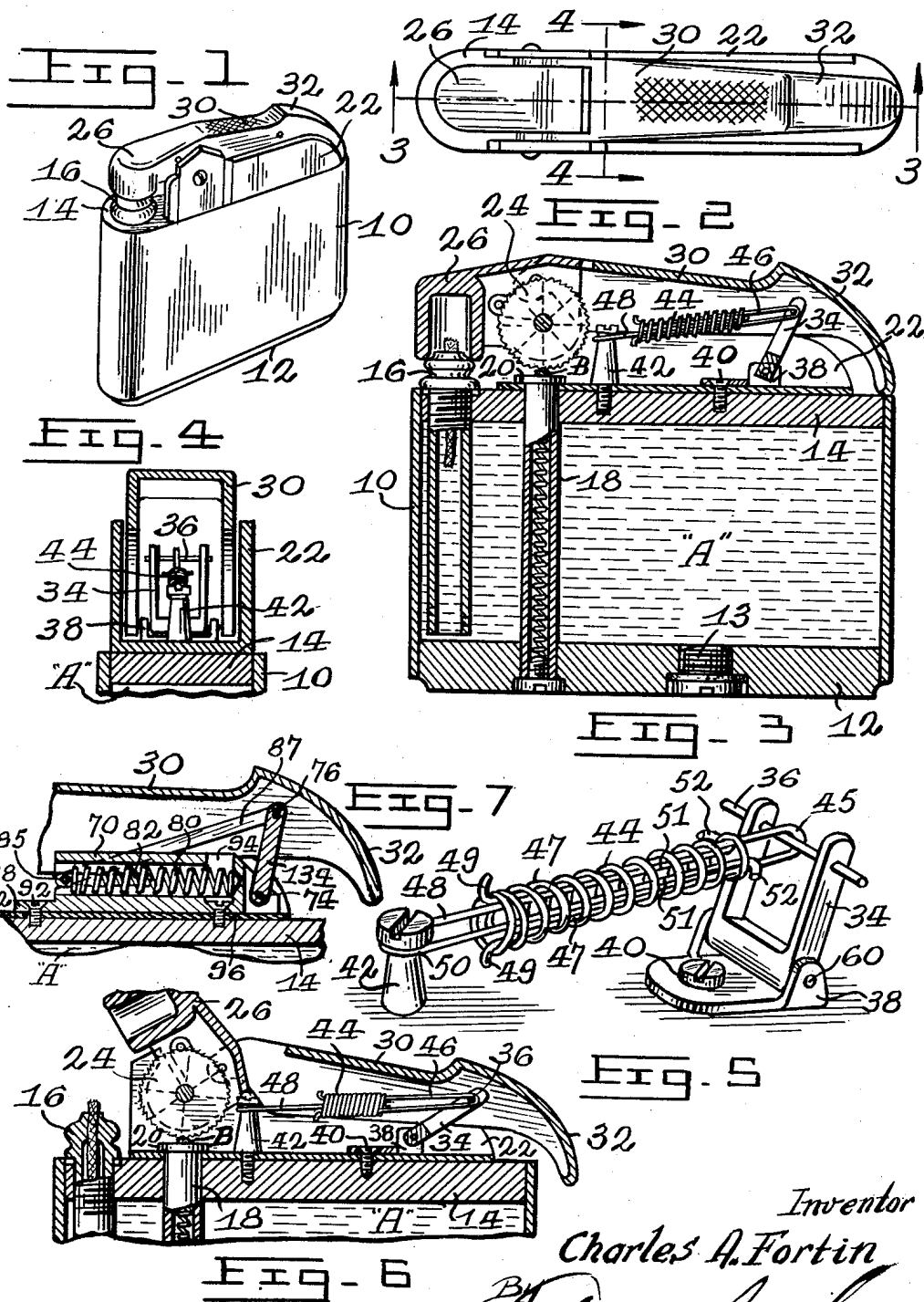
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LIGHTER CONSTRUCTION

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## LIGHTER CONSTRUCTION

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1

### Introduction

This invention relates to automatic pyrophoric lighters for cigarettes or cigars.

There have been many designs proposed for lighters of this type and many patents granted. Many of these lighters are most serviceable, but they possess certain disadvantages in the mechanism, making them difficult to manufacture and in some cases difficult to operate.

One of the more common disadvantages of prior designs is that they are difficult to operate. One type depends on straight downward pressure of the thumb. In this type, the thumb pressure acts directly against the spring pressure. The more you press the greater the resistance of the spring. This means that the lighting movement instead of being accelerated towards the end of the stroke is slowed up by the increasing resistance of the spring.

Other lighters have a diagonal movement which is more horizontal than vertical. In this type, the return spring for the actuating lever is highly subject to breaking or else if the spring is not strong enough it will not return the lever to closed position.

The applicant recognizes these problems and aims to provide a novel guiding and resilient return means for the actuating lever of a lighter of this nature which avoids the disadvantages of both of the prior art types but also possesses their advantages.

### Applicant's development

Accordingly, the present invention is an actuating lever guide means whereby the actuating lever of a pyrophoric lighter is guided in a downward and rearward motion on depression of the lever and a resilient return spring arrangement that co-operates with the lever guiding means to return the actuating lever to its original position in an upward and forward motion.

More specifically, the present invention is embodied in a pyrophoric lighter of the type having a casing constituting a fuel reservoir, an actuating lever mounted on top of the casing above the fuel reservoir with a snuffer cap or wick cover pivotally connected to the actuating lever that is adapted to rise when the actuating lever is depressed. In accordance with the invention the end of the actuating lever remote from the snuffer cap is pivotally connected to a lever guide member that is anchored for pivotal movement to the top of the lighter casing. This lever guide member is disposed so that depression of the actuating lever causes it to move in an arcuate motion, the

2

end anchored to the casing serving as the radius of the arc with the pivotal connection to the actuating lever guiding the travel of this member downwardly and rearwardly.

Preferably, the lever guiding member is of a substantially U-shaped form with the legs of the U pivotally connected adjacent the ends to a pin extending across the actuating lever. The base portion of the U-shaped lever guiding member is pivotally connected between a pair of upstanding lugs on a bracket that is mounted on the top of the lighter casing. The return spring arrangement for the actuating lever comprises of a coil spring that is pivotally connected between the actuating lever and a spring anchoring member mounted in the upper portion of the lighter casing by means of a pair of spring compressing members. The spring compressing and connecting members are of an elongated substantially U-shaped form and are arranged so that the legs of the members pass through the spring with the ends of the legs bent outwards so as to engage the opposite ends of the spring. The loop portion of one of the members is pivotally connected to the pin pivotally connecting the lever guiding member and the actuating lever, and the loop portion of the other member is pivotally connected to the spring anchoring member so that depression of the actuating lever pulls the spring depressing members in opposite directions through the spring and thus compresses the spring inwardly at both ends by means of the hook portions at the end of the legs. When the actuating lever is released the spring expands so as to draw the spring compressing members towards each other and thus raises the actuating lever upwards and forwards to its original position.

As an alternative construction the block pivotally mounting the lever guiding member is elongated and is centrally bored for at least a portion of its length so as to accommodate a coil spring. This elongated block is also slotted at both sides axially of the boring and a lever arm is pivotally connected to the lever guiding member, as in the preferred construction, and also includes a pin projecting at right angles that is adapted to ride in the slot so as to engage and compress the spring when the guiding lever is moved downwards and rearwardly. The motion of the actuating lever in this form of construction is the same as previously described.

### Detailed description

Having thus generally described the nature of the invention, particular reference will be

3

made to the accompanying drawings, and in which:

Figure 1 is a side view in perspective elevation of a lighter embodying an actuating lever guiding and return arrangement constructed in accordance with the invention.

Figure 2 is a top plan view of the lighter construction of Figure 1.

Figure 3 is a vertical cross section along the line 3—3 of Figure 2.

Figure 4 is a section of Figure 2 along the line 4—4.

Figure 5 is an enlarged detail view in perspective elevation of the spring and guiding lever arrangement.

Figure 6 is a sectional view corresponding to Figure 3 illustrating the lever and spring in the depressed position.

Figure 7 is a sectional view of a portion of a lighter construction illustrating an alternative form of a lever return spring arrangement.

Referring more particularly to the drawing illustrating a preferred form of pyrophoric lighter embodying an actuating lever guide means and lever return spring means constructed in accordance with the invention, the main body of the lighter is made up of a casing 10 having a base 12 and a top portion 14 press fitted into the ends of the casing 10 so as to provide a reservoir A adapted to contain lighter fluid. The base 12 is provided with an opening and a closure screw 13 so as to provide a means for filling the reservoir A and a wick tube 16 and flint tube 18 are provided that respectively extend into and through the reservoir A.

The end of the flint tube 18 extends slightly beyond the surface of the top portion 14 and is provided with an outstanding flange 20 through which the flint B protrudes when the lighter is in operative condition.

The operative portion of the lighter is mounted on a substantially U-shaped bridge portion 22 that includes a base and upstanding flanges at each side of the base portion. Preferably, the flanges of the bridge portion 22 are formed so as to accommodate the usual arrangement of an abrasive spark wheel 24, a ratchet spring, and a snuffer cap or wick cover 26. This arrangement is rotatably mounted between the flanges of the bridge portion 22 so that the upwardly movement of the snuffer cap 26 rotates the wheel 24. This portion of the lighter is common and is well known in the art.

The base portion of the bridge portion 22 illustrated is provided with a centrally disposed U-shaped slot which, when the bridge 22 is mounted on the top portion 14, slidably fits under the flange 20 of the spark tube 18.

An actuating lever 30, having a substantially U-shaped form in general cross section, is mounted between the flanges of the bridge portion 22 and is pivotally connected at each side to the snuffer cap 26 so that depression of the lever 30 is adapted to raise the cap 26.

The actuating lever 30 illustrated is formed so as to have a projecting portion 32 adapted to be engaged by the thumb of the operator and a substantially U-shaped lever guiding member 34 is pivotally connected to the actuating lever 30 by a pin 36 extending across the lever. The base portion of the guiding member 34 is pivotally mounted on a supporting block 38 anchored to the base portion of the bridge 22 by means of a screw 40 that passes through the block 38 of the bridge 22 and is threadably engaged in a tapped opening provided in the top portion 14.

4

A spring anchoring member 42 mounted in spaced apart relationship from the supporting block 38 includes a screw threaded end that also passes through the bridge portion 22 to threadably engage with a further tapped opening provided in the top portion 14. This arrangement makes the removal of the entire top portion of the lighter a simple matter. By merely removing the spring anchoring member 42 and the screw 40 the slot in the base of the bridge 22 can be slid back from engagement with the flange 20 of the flint tube 18 and the whole top can be lifted from the main body of the lighter.

With particular reference to Figure 5 of the drawings illustrating the preferred arrangement of the resilient return means for the actuating lever, a spiral spring 44 is provided and is connected between the spring anchor member 42 and the actuating lever 30 by a pair of spring compressing members 46, 48. Each of the members 46, 48 are formed to constitute an elongated substantially U-shaped member, the loop portion 45 of the member 46 surrounding the pin 36 so as to form a pivotal connection, with the legs 47 of the member 46 passing through the spring 44, the ends of the legs 47 being bent outwardly to form hooks 49 adapted to engage the end of the spring. The loop portion 50 of the other of the spring compressing member 48 is placed around the spring anchoring member 42 with the legs 51 passing through the spring and terminating in hooks 52 adapted to engage the end of the spring 44 opposed from the end engaged by the hooks 49 of the member 46. With this arrangement, when the actuating lever 30 is depressed the lever guiding member 34 moves in an arc about the pivot point 60 and so guides the lever 30 downwardly and rearwardly. With this motion the members 46, 48 are pulled past each other in opposite directions, the hooked ends 49, 52 compressing the spring 44. Upon release of the actuating lever 30 the spring 44 expands forcing the hooked ends 49, 51 away from each other thus reducing the effective combined length of the members 46, 48 and returning the actuating lever 30 to its original position in a forward and upward movement.

An alternative lever return spring arrangement is shown in Figure 7. In this embodiment the supporting block 38 is replaced by an elongated block 70 that includes a slotted end portion 72 to which one end of a lever guide member 134 is pivotally mounted as indicated at 74. The other end of the lever guide member is pivotally mounted to the actuating lever 30 by means of a pin 76. The block 70 is bored to provide a chamber 78 adapted to house a coil spring 80, and is also slotted at both sides axially of the chamber 78 as indicated at 82. A lever member 87 pivotally connected at one end to the lever guide member 134 by means of the pin 76 includes a pin 85 extending at right angles from the other end that is adapted to ride in the slots provided in the block 70 and so compress the spring 80 within the spring housing chamber 78.

The block 70 includes an extended end portion 88 having an opening to accommodate a screw 92 that passes through the bridge 22 to threadably engage in a tapped opening in the lighter top portion 14. A second opening 94 completely through the block 70 allows a second screw 96 to also pass through the bridge 22 and engage with the top portion 14 so that the en-

5

6

tire top portion of the lighter may be easily removed as previously described. With this arrangement the motion of the actuating lever 30 pivots the lever guide member 134 about the pivot point 74 and the lever arm 84 through the pin 85 compresses the spring 80 within the block 70. On release of the actuating lever 30 the spring 80 urges the pin 85 outwards and the lever arm 84 returns the lever guiding member in an upward and forward arc, returning the actuating lever 30 to its original position.

I claim:

1. In a lighter, a casing constituting a fuel reservoir, an actuating lever mounted over said reservoir, a snuffer cap pivotally connected to said actuating lever and adapted to rise on depression of said lever, a lever guiding member having one end pivotally connected to said actuating lever with the other end anchored for pivotal movement to said casing above said fuel reservoir, a spring anchoring member mounted on said casing above said fuel reservoir, a coil spring mounted on said casing above said fuel reservoir in axial alignment with and beneath said actuating lever with one end disposed adjacent said lever guiding member and the other end disposed adjacent said spring anchoring member, at least one elongated spring compressing member extending along the length of said spring and having one end pivotally connected to said lever guiding member adjacent said actuating lever with the other end engaging the end of said coil spring remote from said lever guiding member, said lever guiding member being normally disposed at an acute angle relative to a perpendicular line through the pivotal connection of said lever guiding member with said casing, whereby said spring compressing member is adapted to be placed in tension by the depression of said actuating lever and said tension is adapted to cause the spring engaging end of said spring compressing member to move towards said lever guiding member and compress said coil spring between said spring compressing member and said spring anchoring member.

2. In a lighter as claimed in claim 1, wherein said elongated spring compressing member extends through said coil spring.

3. In a lighter, a casing constituting a fuel reservoir, an actuating lever mounted on said casing, a snuffer cap pivotally connected to said actuating lever and adapted to rise on depression of said lever, a lever guiding member having one end pivotally connected to said actuating lever with the other end anchored for pivotal movement to said casing above said fuel reservoir, a spring anchoring member mounted on said casing in spaced apart relationship from said lever guiding member, and resilient actuating lever return means including a coil spring in axial alignment with and extending beneath said actuating lever, a first spring compressing member passing

through said spring and being pivotally connected to said actuating lever adjacent said lever guiding member, a second spring compressing member passing through said spring and being pivotally connected to said spring anchor member, whereby said first and second spring compressing members are adapted on depression of said actuating lever to compress said spring simultaneously from both ends, and release of said actuating lever allows said spring to expand and return said actuating lever to its original position.

4. A lighter as claimed in claim 3, wherein each of the spring compressing members are of substantially elongated U-shaped form with the legs of the U passing through the spring and having the ends of the legs bent to constitute hooks adapted to contact one of the ends of the spring, the members being disposed within the spring in opposed relationship so that both ends of the spring are engaged, whereby movement of said spring compressing members in opposite directions is adapted to compress said spring between said hook-shaped ends.

5. In a lighter, the combination of a casing constituting a fuel reservoir, an actuating lever mounted on said reservoir, a snuffer cap pivotally connected to said actuating lever adapted to rise on depression of said lever, a lever guiding member having one end pivotally connected to said actuating lever with the other end pivotally mounted on a spring retaining block, said spring retaining block being mounted on said casing and including a substantially centrally disposed recess disposed in axial alignment with and beneath said actuating lever, a coil spring mounted in said recess, a lever means between said lever guiding member and spring retaining block adapted to compress said spring within said block on depression of said lever.

6. A lighter as claimed in claim 5, wherein the spring retaining block is slotted at both sides along the axis of said recess, and said spring compressing lever means comprises a lever member extending the length of said block and having one end pivotally connected to said lever guiding member with a pin projecting from the other end adapted to ride in said slots and engage the end of said spring housed within said block.

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