PATENT SPECIFICATION

DRAWINGS ATTACHED

942,023

942,023

Date of Application and filing Complete Specification Feb. 24, 1961.
No. 6891/62.
Application made in Switzerland (No. 2,505) on March 4, 1960.
Complete Specification Published Nov. 20, 1963.

Index at acceptance: —Class F4 9B.
International Classification: —A 24 f

COMPLETE SPECIFICATION

Actuating Mechanism for the Friction Wheel of a Pyrophoric Lighter

We, THORENS S.A., a company organized under the laws of Switzerland, of Sainte-Croix (Switzerland), do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention concerns lighters of the kind having a rotatable friction wheel which is in engagement with a pyrophoric stone.

According to the invention a lighter comprises a friction wheel in engagement with a pyrophoric stone, a pivotally mounting driving member for driving the friction wheel, an actuating lever cooperating with a tipping device, the tipping device being movable between two extreme positions, through an equilibrium position and being pivotally connected to the driving member, resilient means biasing the tipping device towards both of its extreme positions, and a second lever which cooperates with the actuating lever to displace the tipping device from one to the other of its extreme positions through its equilibrium position, the actuating lever and the driving member being pivoted co-axially with the friction wheel.

According to one feature of the invention the tipping device may include a coupling element one end of which is hinged to the driving member and the other end of which is pivotally connected to the actuating lever.

In a preferred construction the second lever carries at least one pair of spaced fingers adapted to cooperate with an abutment carried by the coupling element so as to pivot the latter from one of its extreme positions past its equilibrium position, this latter position being attained when the pivotal axis of the driving member, the hinge between the driving member and the coupling element, and the pivotal connection between the coupling element and the actuating lever are in a straight line.

In order that the present invention may be more readily understood, one embodiment thereof will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a section through the actuating mechanism of one embodiment of a lighter constructed in accordance with the present invention,

Figure 2 is a section along line II of Figure 1,

Figure 1a is a similar view to Figure 1 but shows the mechanism in a different position and,

Figure 3 is a section along line III—III of Figure 1.

The actuating mechanism of the lighter shown in the accompanying drawings comprises a friction wheel 1 mounted in a frame comprising a support 2 and a side plate 3. The friction wheel 1 revolves freely on a tube 4 which carries a screw 5 retaining the cover plate 3 on the support 2. The friction wheel 1 is also located between two arms 6 and 7 of a driving member in the form of a stirrup 8 which is pivoted freely on the tube 4 and which is connected to the friction wheel 1 through a one-way drive coupling. This coupling comprises a slotted elastic washer 9 secured to the stirrup 8 with one of its lips co-operating with a front toothing 10 on the friction wheel 1.

A coupling element 11 of rectangular cross section is hinged at one end to two studs 12 and 13 riveted on the arms 6 and 7 of the stirrup 8. The coupling element 11 is provided at its other end with two slots 14 and 15 formed one in each of its lateral

[*Price 4s. 6d.*]

faces. A pin 16 carried by an actuating lever 17 engages in these slots 14 and 15 and forms a pivotal connection between the coupling element 11 and the lever 17. The lever 17 consists of two parallel arms 18 and 19 located one on either side of the coupling element 11. The lever 17 is pivoted at one end about the tube 4 and also carries an actuating member 20 having a pushing face 21 by means of which it can be depressed digitally. A return spring 22 is wound on a screw 23 retaining the side plate 3 on the frame 2 and acts on a pin 24 fixed between the arms 18 and 19 below the pin 16 so as to maintain the actuating lever 17 in its rest position illustrated in figure 1 this rest position being defined by a pin 25 and a screw 26 which also helps to retain the side plate 3 on the support 2.

A coil spring 27 located within the coupling element 11 bears on the pin 16 and on a further pin 28 fast on the other end of the coupling element 11. Under the action of this spring 27 the stirrup 8 occupies a rest position shown in figure 1 and defined by an abutment 29 on the support 2.

A second lever 30 having two parallel arms 31 and 32 located one on each side of the coupling element 11 and between the arms 18 and 19 of the actuating lever 17 pivots freely on the pin 25. The foreparts of the arms 31 and 32 each have two fingers 41 and 42 disposed on either side of the coupling element so as to engage the projecting end of the pin 28 whilst the rear part of the lever 30 has two symmetrical slots 34 in which a pin 35 fast with the actuating lever 17 pivots and slides.

A pyrophoric stone 36 is slidably carried in a housing 37 formed in the support 2 and is held against the friction wheel 1 by a spring 38 wound around the pin 25. The free extremity of the spring 38 passes through a slot 39 in the housing 37 to bear on the stone, and the other extremity bears on a boss 40 on the support 2.

The actuating mechanism operates as follows:

When a user of the lighter exerts a push *f* on the face 21 of the actuating member 20 he pivots the actuating lever 17 around the tube 4 and against the action of the return spring 22. The pin 16 of the lever by cooperating with the slots 14 and 15 and pivots the coupling element 11 in the same direction around the studs 12 and 13. Simultaneously the pin 35 of the lever 17 cooperating with the slots 33 and 34 pivots the lever 30 around the pin 25 in the clockwise direction.

As soon as the lever 17 has effected a stroke of a predetermined amplitude the lower fingers 41 of the lever 30 engage the pin 28 and exerts a push *f2* on the coupling element 11 which then pivots around the pin 16 and drives the stirrup 8 which in turn rotates the friction wheel 1 through the one-way drive coupling.

The coupling element 11 is simultaneously slidden back along the pin 17 by the stirrup 8 in the direction *f3* against the spring 27. As soon as the coupling element 11 passes its equilibrium position in which the studs 12, 13 are in a straight line with the axis of the friction wheel 1 and the pin 16, the spring 27 expands rapidly and causes a rapid displacement of the stirrup 8 to the position shown in broken lines in figure 1*a* which is defined by an abutment 43 on the support 2, the coupling element and the spring 27 thus providing a tipping device which acts in the manner of a tumbler switch.

The friction wheel is thus driven at a rate independent of the rate of movement of the actuating member 20, which member eventually comes to rest against a boss 44 on the support 2.

The lever 17 also carries an arm 45 adapted to simultaneously open a valve of a container containing gas.

When the operator releases the pressure exerted on the actuating member 20 the lever 17 pivots in the anti-clock-wise direction under the action of the return spring 22. The pin 35 pivots the lever 30 in the same direction and the upper fingers 42 of the lever engage the pin 28 of the coupling element so as to pivot the stirrup 8 in the clock-wise direction. Due to the one-way coupling the friction wheel remains stationary. As soon as the equilibrium position of the coupling element is passed the spring 27 rapidly moves the coupling element 11 and the stirrup 8 into their rest positions.

The hereinbefore described mechanism for a lighter has several advantages over known lighters.

As clearly shown in the drawing, the lever 17 presents a length approximately equal to the total length of the mechanism and consequently the length of the casing intened to contain the mechanism. For a given overall size the movement of the control member 20 approaches as near as possible to a retilinear movement which ensures a very simple movement familiar to the great majority of the users of lighters.

The attached drawings also show that this mechanism is of a small height *h* but extends the whole width *b* of the casing. Indeed this mechanism presents an overall size which is not higher than that of the semi-automatic type lighters actually on the market. The mechanism described also has levers of considerable length which do not necessitate a high machining precision and the symmetrical positioning of which ensures rigidity in the mechanism.

The lever 30 also provides important advantages. Due to the help given by the

lever 30 there is provided a tipping mechanism which works with a reduced control stroke in both directions. On the other hand, if for one reason or another the tipping mechanism loses its efficiency, the operator can in acting on the actuating member with an increased pressure make the friction wheel turn at a sufficient speed to ensure a sufficient spark. The non-working of the tipping device, that is of the actuation of the stirrup by the spring 27, does not therefore prevent manual working of the mechanism.

WHAT WE CLAIM IS:—

1. A lighter comprising a friction wheel in engagement with a pyrophoric stone, a pivotally mounting driving member for driving the friction wheel, an actuating lever cooperating with a tipping device, the tipping device being movable between two extreme positions through an equilibrium position and being pivotally connected to the driving member, resilient means biasing the tipping device towards both of its extreme positions, and a second lever which cooperates with the actuating lever to displace the tipping device from one to the other of its extreme positions through its equilibrium position, the actuating lever and the driving member being pivoted coaxially with the friction wheel.

2. A lighter according to claim 1 wherein the tipping device includes a coupling element one end of which is hinged to the driving member and the other end of which is pivotally connected to the actuating lever.

3. A lighter according to claim 2 wherein the second lever cooperates with the actuating lever through a pin-and-slot connection.

4. A lighter according to claim 3 wherein the second lever carries at least one pair of spaced fingers adapted to cooperate with an abutment carried by the coupling element so as to pivot the latter from one of its extreme positions past its equilibrium positions, this latter position being attained when the pivotal axis of the driving member, the hinge between the driving member and the coupling element, and the point of connection between the coupling element and the actuating lever are in a straight line.

5. A lighter according to claim 4 wherein the connection between the coupling element and the actuating lever consists of a pin carried by the actuating lever cooperating with a slot in the coupling element.

6. A lighter according to claim 5 wherein the resilient element acts along the length of the coupling element.

7. A lighter according to claim 6, wherein the resilient element is a compression spring which acts between an abutment on the coupling element and the pin on the actuating lever cooperating with the coupling element.

8. A lighter according to any one one of the preceding claims wherein the driving member cooperates with the friction wheel through a one-way drive.

9. A lighter according to any one of the preceding claims wherein the driving member is in the form of a stirrup.

10. A lighter according to any one of the preceding claims and including a return spring acting on the actuating lever to maintain it in its rest position.

11. A lighter substantially as hereinbefore described by way of example and with reference to the accompanying drawing.

R. F. COWLING & CO.,
Chartered Patent Agents,
Bank Chambers, 329, High Holborn,
London, W.C.1.

Leamington Spa: Printed for Her Majesty's Stationery Office by the Courier Press.—1963.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

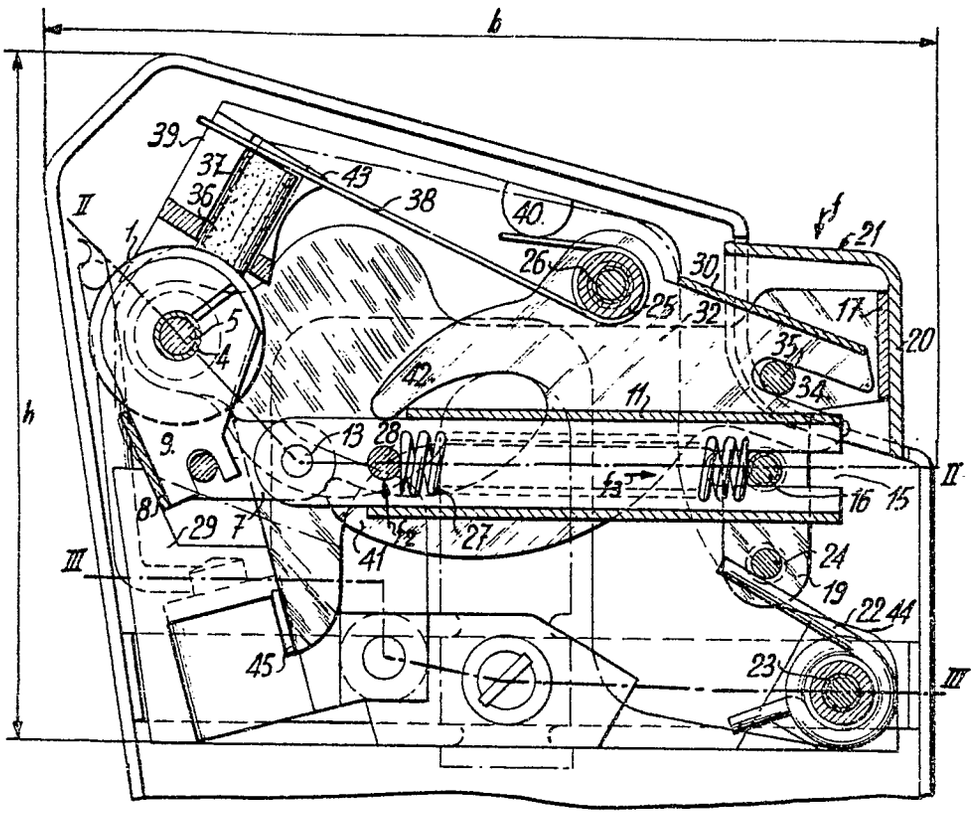
b
h
39
37
36
43
38
40
21
26
30
25
32
17
20
35
34
42
11
13
28
9
8
29
7
27
41
16
15
24
19
22
44
45
23
I
II
III

Fig. 1

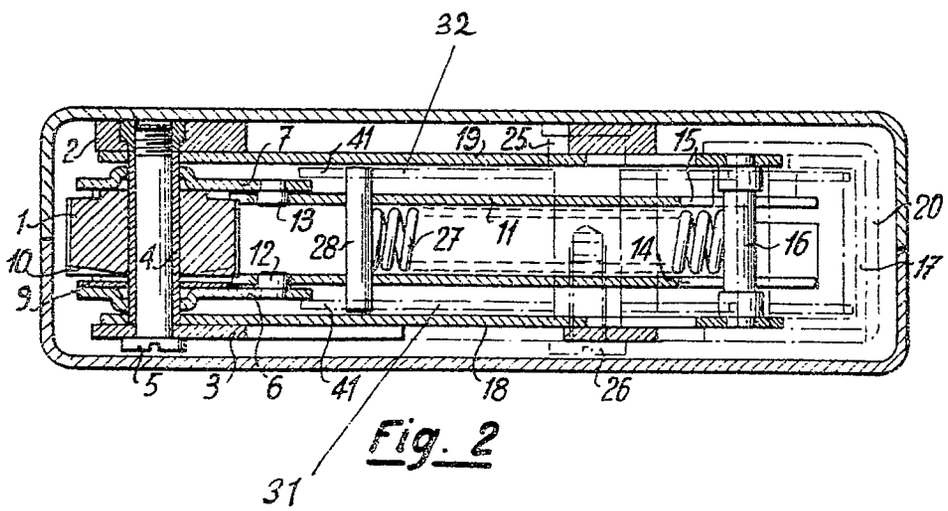
32
2
7
41
19
25
15
1
13
20
10
4
12
28
27
11
14
16
17
9
5
3
6
41
18
26
31

Fig. 2

942,023 COMPLETE SPECIFICATION
2 SHEETS

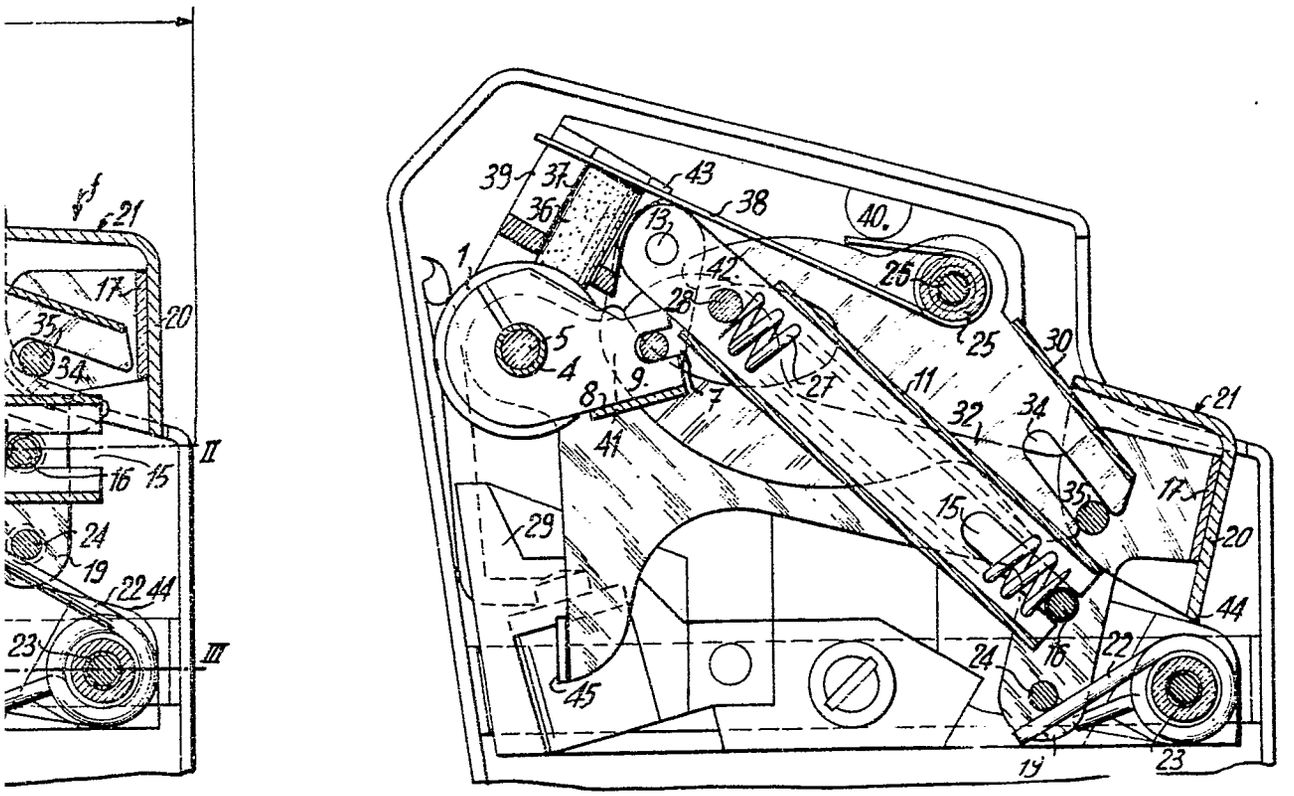

Fig. 1a

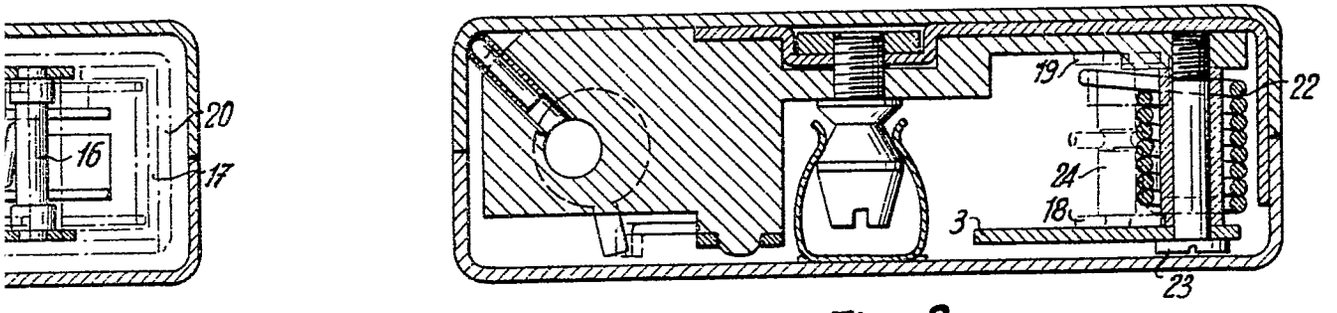

Fig. 3

942,023 COMPLETE SPECIFICATION
2 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

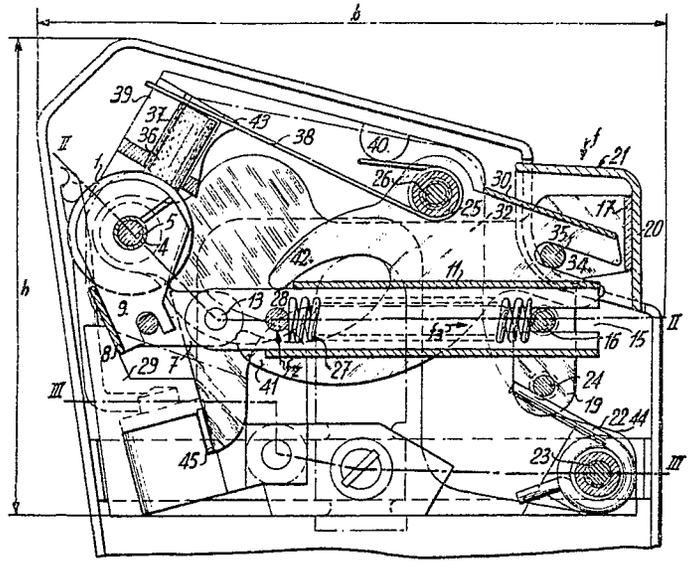

Fig. 1

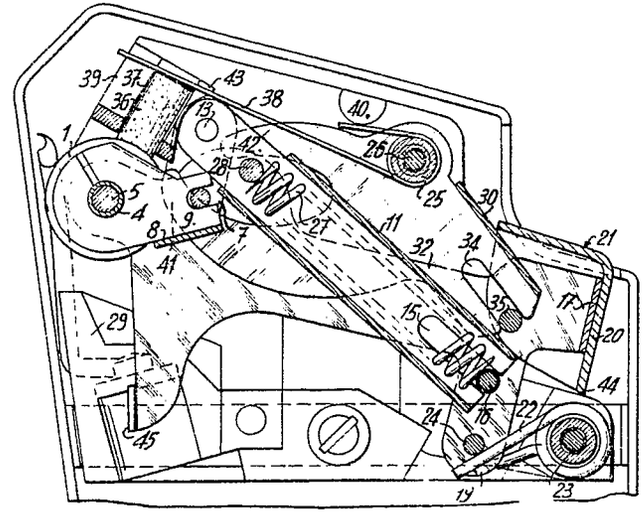

Fig. 1a

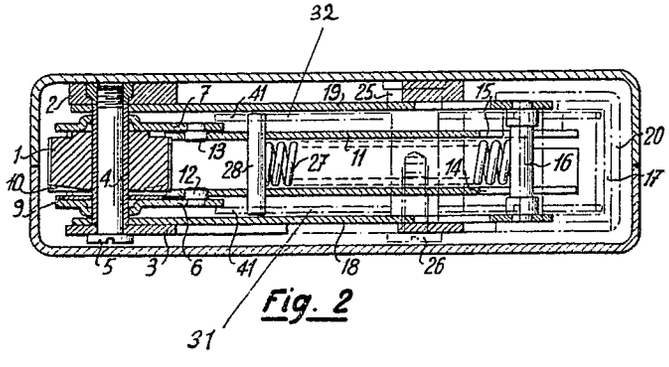

Fig. 2

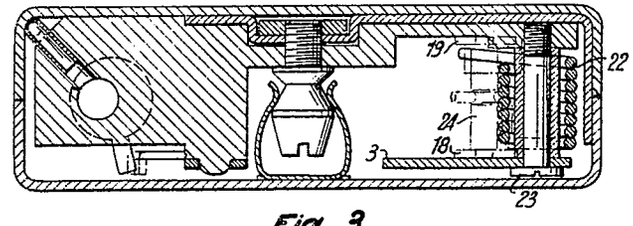

Fig. 3