



Fig. 1

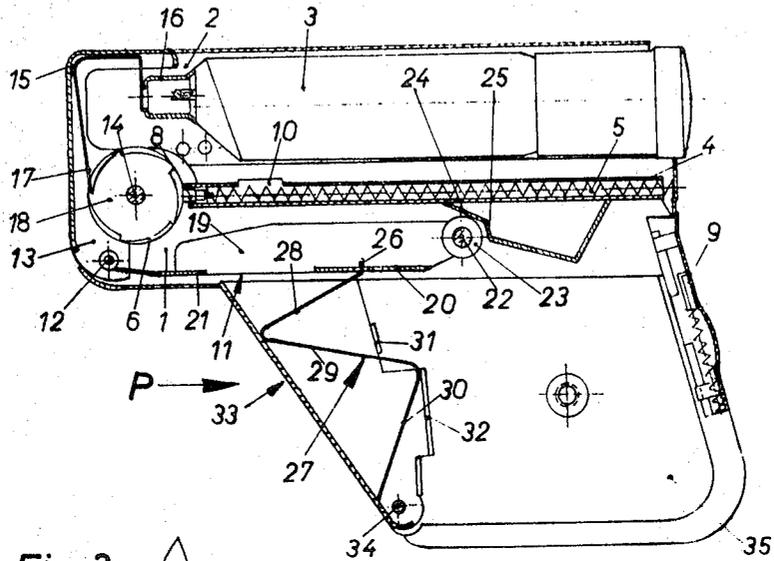
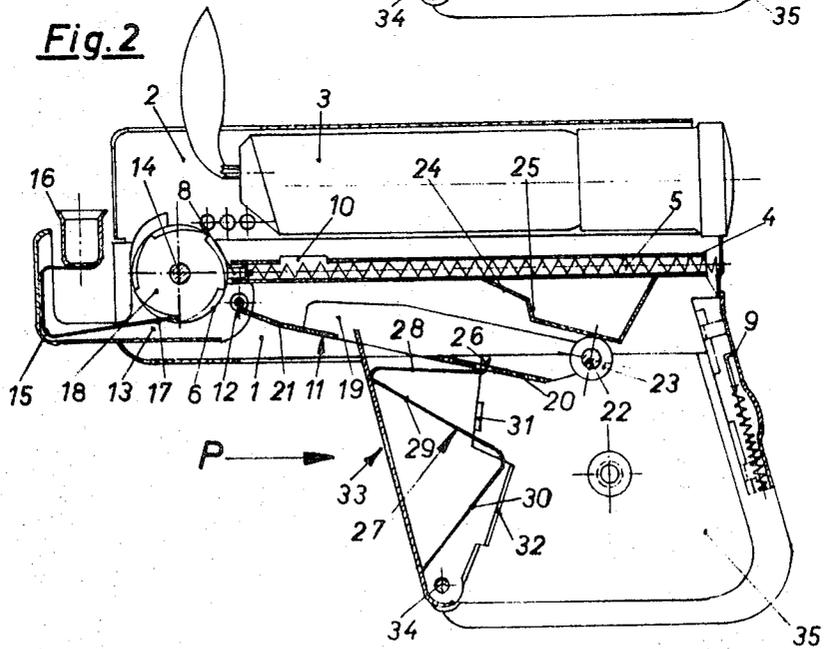
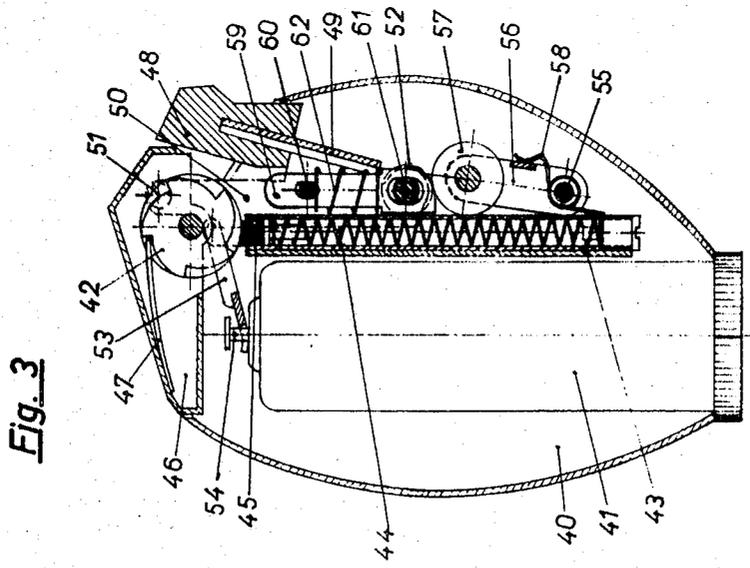
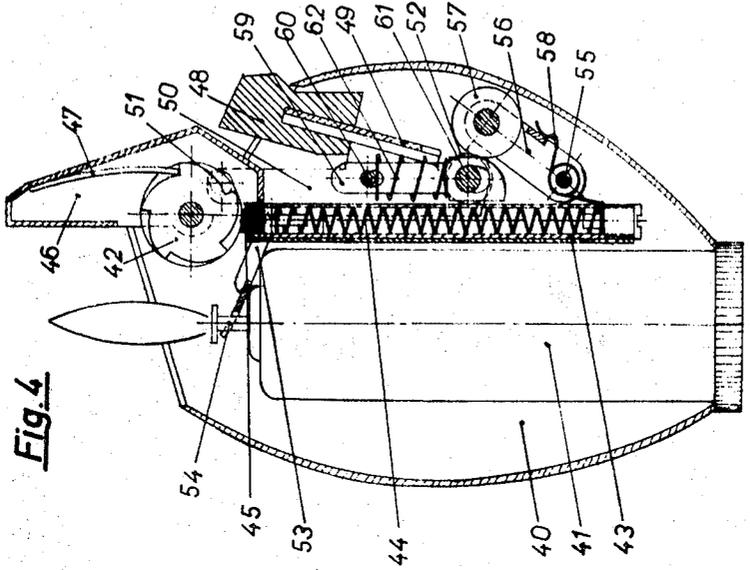


Fig. 2





## DEVICE FOR ACTUATING THE FRICTION WHEEL OF A PYROPHORIC LIGHTER

This invention relates to an actuation device for actuating the friction wheel of a pyrophoric lighter, in which the friction wheel is rotatable by a driving member, which is displaceable by an actuating member, and a one-way coupling member, which is connected to the driving member, a hump or like interference being disposed in the path of the driving member to obstruct the movement thereof, and the driving member being urged against the hump by a spring.

When the user of such devices desires to actuate the lighter, he must exert a larger force to overcome the resistance due to the hump so that the excess force which is available when the hump has been bypassed tends to pull, through the actuating device, and a particularly intense shower of sparks is produced.

In known devices of that kind, a spring is provided, which urges the driving member against the hump, and another spring must be provided to enforce a return of the driving member when the user has discontinued the actuation. This requirement involves an additional structural expenditure and the usual springs for restoring the driving member have basically the disadvantage that their restoring force increases with the extent to which the actuating member has been displaced or pivotally moved. As a result, the user must exert a relatively large force to hold the actuating member when the flame is burning; this requirement is most inconvenient.

It is an object of the invention to avoid these disadvantages. This is accomplished in that a single spring is utilized both to urge the driving member against the hump and to serve as a restoring spring for the driving member. The measure adopted in accordance with the invention eliminates one spring and its abutments and affords the even more important advantage that the mechanism can be designed so that the restoring force decreases towards the end of the rotation of the friction wheel to the position in which the user holds the actuating member.

Further features of the invention will be described more fully hereinafter with reference to two embodiments shown by way of example in the accompanying drawings, in which

FIGS. 1 and 2 show a pistol-shaped liquid fuel lighter according to the invention respectively in closed and open positions; and

FIGS. 3 and 4 show a gas fuel lighter in closed and open positions, respectively.

The lighter shown in FIGS. 1 and 2 comprises two housing parts 1 and 2. Part 2 accommodates a fuel tank 3. A flint tube 4, which contains a spring 5, as well as a friction wheel 6 are accommodated in part 1. Parts 1 and 2 are guided one on the other. The flint spring 5 bears at one end on part 2 and at the other end on a flint 8 to urge the flint against a friction wheel 6 on part 1 while tending to urge the housing parts 1 and 2 apart. A slider 9 locks the two parts together so that the spring 5 can displace the part 2 relative to the part 1 only when the slider has been moved down; such movement of part 2 relative to part 1 causes an inserting opening 10 to be exposed for the insertion of a new flint.

The friction wheel 6 can be rotated by a driving member 11, which is pivoted at one end by a pin 12 to a lighter cover 13. The cover 13 is rotatable about a friction wheel axle 14. A resilient plate 15 is secured to the cover 13. At one end of the plate 15, the latter carries a wick cap 16. The plate 15 has an arm 17, which engages teeth of a one-way coupling wheel 18. In the embodiment shown by way of example, the one-way coupling device consists of the cover 13, the plate 15 and the one-way coupling wheel 18. The driving member 11 comprises two flanges 19, which are interconnected by webs 20 and 21. A roller 23 constituted preferably of plastic material is mounted on an axle 22 between the flanges 19 at that end of the driving member which is remote from the pin 12. The roller 23 engages an upwardly inclined cam 24, which has a hump 25, which is positioned in closely spaced relation behind the roller 23 in the direction of movement of the driving rod 11 when the cover 13 is closed.

One end 26 of a leaf spring 27 extends into a slot formed in the web 20 and has three arms 28, 29, and 30, which are angularly related to each other. Near the transition from outer arm 30 to intermediate arm 29, the spring 27 is gripped between projections 31 and 32 of an actuating member 33. The latter consists of a sectorlike member, which is pivotally mounted on a pin 34 carried by a grip portion 35, which is secured to the housing part 1.

The device which has been shown has the following mode of operation: When it is desired to ignite the lighter, the actuating member 33 is moved in the direction of the arrow P so that the spring 27 moves the driving member 11 to rotate the cover 13 and by means of the plate 15 the one-way coupling wheel 18 and the friction wheel 6. After a short distance, that movement will be disturbed in that the driving member 11 resiliently engaging the cam 24 causes the roller 23 to strike the hump 25 so that the movement of the driving member is obstructed. The user must then exert a larger force to overcome the resistance. When the hump has been bypassed, the force utilized tends to move the actuating member at a high speed so that the friction wheel is also rotated at a high speed.

During that movement, the roller 23 moves along the cam 24. Because of the inclination of the latter, the spring 27 is stressed so that it tends to restore the driving member. The restoring force does not positively increase but will depend on the selected inclination of the cam 24. In the present example, the cam has a larger inclination at the beginning so that a reliable closing of the lighter is ensured. The smaller inclination behind the hump 25 enables the lighter to be held open easily when the flame is burning. It will be understood that the cam 24 might alternatively be curved.

The lighter shown in FIGS. 3 and 4 comprises a housing 40, which accommodates a fuel tank 41 and an igniting mechanism. The latter comprises a friction wheel 42, a flint tube 43 containing a flint spring 44 and a flint 45, and a one-way coupling member 47, which is secured to a cover 46, and by means of an arrangement which is similar to that of FIGS. 1 and 2 engages teeth of the friction wheel 42.

An actuating member consisting of a pushbutton 48 and an arm 49 is connected to a driving member 50, which at its one end at 51 is pivoted to the cover 46 and at its other end is provided with a roller 52. A lever 53 is mounted on the driving member 50 and serves to open a gas valve 54. An arm 56 is rotatable about a pin 55 and at its free end is provided with a roller 57, which serves as a hump. A spring 58 tends to urge the arm 56 and particularly the roller 57 against the flint tube 43. A plunger 59 is formed with slots, by which it is displaceably mounted on a pin 60 and a pin 61 carrying the roller 52. A spring 62 bears on the pin 60 and on a step of the plunger 59 and tends to urge the plunger 59 against the roller 57.

The lighter illustrated in FIGS. 3 and 4 has the following mode of operation:

In the closed condition of the lighter shown in FIG. 3, the cover 46 will always be held closed even if there is a clearance between the roller 57 and 52 because the plunger 59 is forced against the roller 57 and that force is transmitted by the driving member 50 to the cover 46. This feature enables a compensation of inaccuracies due to the manufacture.

To ignite the lighter, the user presses his thumb against the pushbutton 48 so that the latter assumes the position shown in FIG. 4. This operation causes the driving member 50 to be moved down and the cover 46 to be opened. By means of the one-way coupling member 47, the friction wheel 42 is rotated to produce a spark. The lever 53 is pivotally moved at the same time to open the gas valve. During the movement of the driving member 50, the roller 57 exerts a resistance so that the user must exert a larger force to impart a pivotal movement to the arm 56. When this resistance has been overcome, such large force will no longer be required and the excess force will impart a fast, sudden movement to the friction wheel.

In the open lighter, the spring 58 tends to swing back the arm 56 so as to displace the driving member 50. As that restor-

ing force is relatively small, a small force is sufficient to hold the lighter in an open position.

I claim:

1. An actuating device for actuating a rotatable friction wheel of a pyrophoric lighter, said actuating device comprising a displaceable driving member for rotating the friction wheel, an actuating member for displacing the driving member, a one-way coupling member connected between the actuating member and driving member, a hump disposed in the path of travel of the driving member to obstruct the movement thereof, and a single spring urging the driving member against said hump and exerting a force on the driving member to serve also as a restoring means for the driving member.

2. An actuating device as claimed in claim 1 wherein said driving member includes an arm which is pivotally movable by said spring, and a rising cam formed with said hump and against which said arm is urged by said spring.

3. An actuating device as claimed in claim 2 wherein said spring includes an angled leaf spring having one arm which is connected to said actuating member and a second arm which is connected to said driving member.

4. An actuating device as claimed in claim 3 wherein said spring includes a third arm intermediate the other two arms, said arms of the spring being angularly related to one another.

5. An actuating device as claimed in claim 3 wherein said

driving member is provided with a slot, which receives the second arm of said spring.

6. An actuating device as claimed in claim 1 wherein said hump is constituted by a roller, and a spring-loaded arm carrying said roller at the free end thereof, the latter said arm being pivotally supported and pivotally movable by the driving member.

7. An actuating device as claimed in claim 6 comprising means for maintaining the driving member and the hump in resilient engagement with each other in any position thereof.

8. An actuating device as claimed in claim 7 wherein one of said driving member and said hump includes a resilient plunger which has a position of rest in which it engages the other.

9. An actuating device as claimed in claim 6 comprising a fixed pivot axle supporting said spring-loaded arm for pivotal movement thereon.

10. An actuating device as claimed in claim 1 comprising a resistance means inclusive of said hump opposing movement of the driving member, said resistance means providing diminishing resistance to movement of the driving member after it has bypassed said hump whereby the restoring force decreases towards the end of rotation of the friction wheel.

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