July 29, 1969 H. SCHINDLER 3,458,765

MAGNETIC IGNITER FOR LIGHTERS

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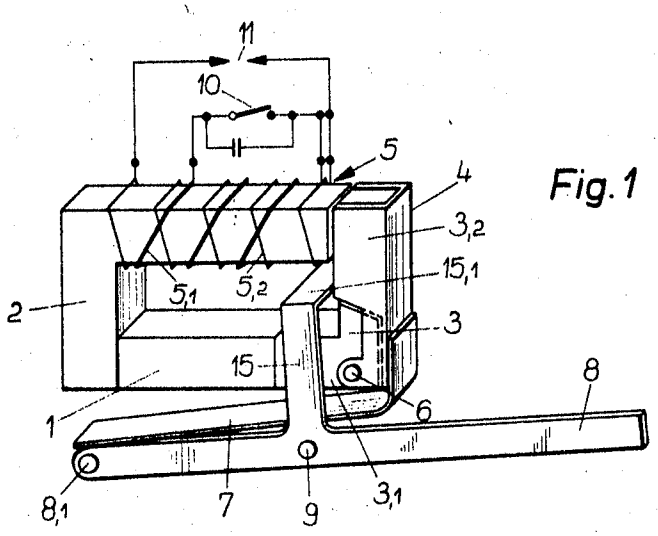


Fig. 1

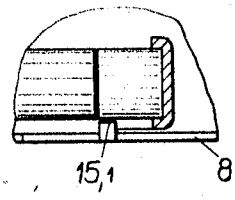


Fig. 2

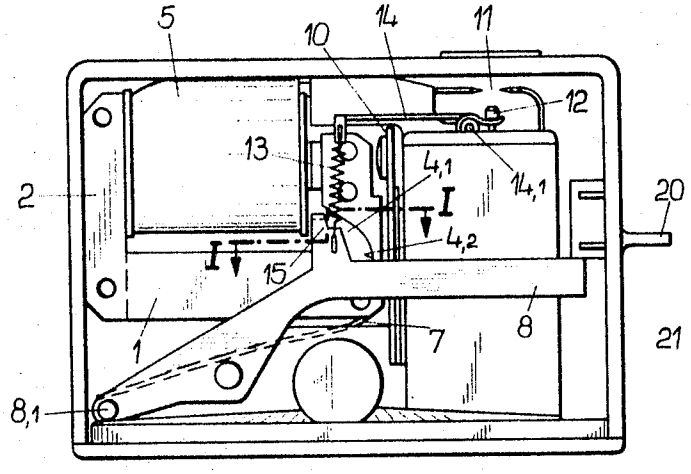


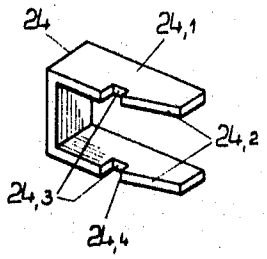
Fig. 3

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Fig. 6



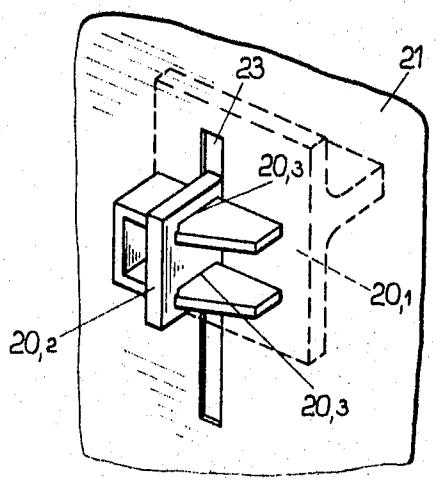


Fig. 5

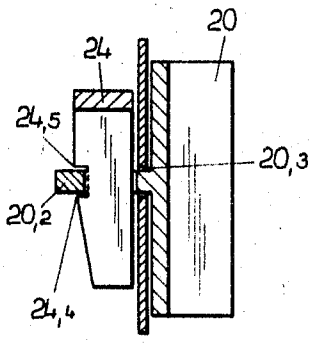
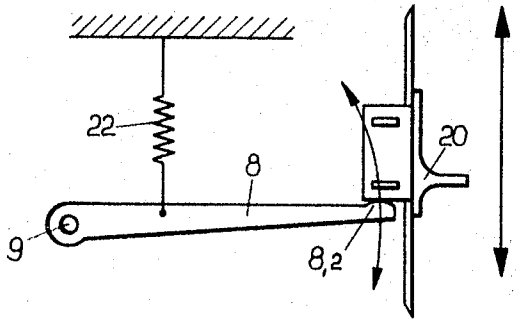


Fig. 7

Fig. 4



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3,458,765

MAGNETIC IGNITER FOR LIGHTERS

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Int. Cl. F23q 3/00
U.S. Cl. 317—81 5 Claims

ABSTRACT OF THE DISCLOSURE

A magnetic igniter having a permanent magnet and a movable armature that is normally actuated by a starting member by way of a spring. An induction coil wound about the magnet and having a secondary electrically connected to ignition electrodes. The igniter also having an operating member to actuate the armature when the actuation through the spring fails.

The invention relates to a magnet igniter for lighters, wherein through a hand operable starting member, force is transmitted to an armature by means of an intermediate energy accumulator, such as a spring; this force counteracts the holding force of the magnet and pulls the rotor off the energizing magnet when the holding force is surpassed.

A magnetic igniter so constructed has the advantage that the armature is disengaged jerkily that is, rapidly, from the energizing magnet of the magnetic (pull-off) igniter; yet, while this great speed is preserved by the action of the accumulator, and thereby there is created in the induction coil of the magnetic igniter linked by the magnetic flux with the energizing magnet, an igniting energy sufficient for igniting the fuel of the lighter, the force applied by hand however is administered only slowly rising. It is, of course, more pleasant for the user to apply a slowly rising force rather than a jerky one.

It is an object of the invention to anticipate and to prevent, in such a magnetic igniter, operational disturbances caused by the failure of the energy accumulator, such as a leaf spring, to respond in time, for example due to fatigue, or due to uncontrollable production tolerances during the manufacture of the spring, and to render certain an emergency functioning in every instance, even when the spring mechanism breaks down.

Further objects and advantages of the invention will be set forth in part in the following specification and in part will be obvious therefrom without being specifically referred to, the same being realized and attained as pointed out in the claims hereof.

In the magnetic igniter according to the invention this problem, broadly speaking, is solved by assigning to the starting member which actuates the spring, an operating member that engages the armature only after the starting member has surpassed its normal predetermined armature actuating position, and the operating member will only then detach the armature forcibly from the energizing magnet.

Especially in view of the small size and the resulting compact construction of a magnetic igniter used for lighters, it is advantageous to have the operating member reach into a cut-out or recess of a guide frame which encloses the laminated armature.

According to a further characteristic of the invention, the operating member is an integral part of the starting member. Thereby any play between the starting and operating members is eliminated, and a definite response of the operating member is assured when the aforesaid predetermined position of the starting member, for normally actuating the armature, has been surpassed.

A simple and reliably working construction of the magnetic igniter is achieved by constructing the starting member in accordance with a preferred embodiment, as a two-armed lever that is turnable about a fixed pivot. This lever cooperates with a handle that protrudes from the lighter housing and acts on a leaf spring which is connected to the armature and serves as an energy accumulator. By means of this leaf spring, or with the aid of the operating member mounted on the lever, the armature is attached from the energizing magnet.

According to an embodiment of the invention, the actuator that acts upon the starting lever is a displaceable handle that is guided on a frame of the lighter housing. The handle is disposed on the free end of the lever when pressed down and tilts the latter towards its pull-off or active position. Thereby there is created in a simple manner a connection between the pressing handle that is guided linearly on the housing frame of the lighter and the tiltable starting lever of the magnetic igniter that is pivoted about a fixed point that is supported from the base of the lighter; this connection is automatically broken when the housing is lifted from the base.

In order to attain a uniform contact of the handle with the starting lever during its entire path of motion, at least one of the interengaging surfaces of the handle and starting lever is formed convexly.

The handle comprises a bridge that protrudes through a slit in the wall of the housing, and a safety member or key is releasably connected to the bridge; the safety member is disposed inside the housing, adjacent the interior surface of the wall thereof, and presses tightly against the same.

The handle thereby is thus guided gently but with little play and without tilting, on one hand by its surface sliding on the outside surface of the wall of the housing and on the other hand by the surface of its safety member sliding on the inside surface of the wall of the housing, so that the handle presses with its own weight onto the starting lever.

For the purpose of easily disconnecting the handle from the housing, the safety member is formed of a U-shaped bracket member with two legs and a slanting surface on each leg. Each leg is placeable into a slot of the bridge of the handle; the slanting surfaces of the U-shaped bracket member extend each to a groove about midway on the leg that has a width matching that of the bridge.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective schematic view of a magnetic igniter in accordance with an embodiment of the invention;

FIG. 2 is a fragmentary sectional view taken on the line I—I of FIG. 3;

FIG. 3 is a side elevational view of a magnetic igniter built into a lighter and shown in a housing from which the cover has been removed;

FIG. 4 is a schematic elevational view demonstrating the connection between the handle and the starting member;

FIG. 5 is a fragmentary perspective view of a portion of a lighter housing with bridge and key;

FIG. 6 is a perspective view of the key; and

FIG. 7 is a horizontal sectional view taken midway of the bridge of FIG. 6.

In carrying the invention into effect in one of the embodiments which has been selected for illustration in

the accompanying drawings and for description in this specification, and referring now particularly to FIG. 1, the magnetic system of the magnetic igniter is a simple closed magnetic flux circuit that comprises a permanent magnet 1 and two adjacent magnet yokes or sections 2 and 3. The section 2 is L-shaped and carries coil means of electric circuit means, such as an induction coil 5 which comprises a primary winding 5.1 and a secondary winding 5.2.

The section 2 is formed in two parts. It comprises a portion 3.1 directly adjacent the permanent magnet 1 and a portion 3.2 that serves as an armature. The portion 3.2 is supported by a frame 4 that is made of non-magnetic material, and is rotatable about a hinge 6. The armature 3.2 is rotatable about the hinge 6 between a closing position shown in FIG. 1 wherein it closes the magnetic flux circuit and, respectively, an open position (not shown) wherein it interrupts the magnetic flux circuit.

A leaf spring 7 is secured to the armature 3.2 and serves as an energy storage battery or accumulator. The spring 7 is actuated by means of a contacting portion 8.1 of the starting member 8. The starting member 8 is in the form of a lever that is tiltable about a pivot 9 to and from the inactive position shown in FIG. 1.

By pressing down the starting lever 8 about the pivot 9, the leaf spring 7 will be loaded by engagement with the contacting portion 8.1 of the lever 8, until the spring 7 tears the armature 3.2 off its closing position adjacent the magnetic section 3. The lever will then be in a predetermined position.

By the resulting sudden change of the magnetic field there is induced in a known manner in the primary winding 5.1 of the induction coil 5 an electric current that flows at first through the closed primary circuit; this current counteracts by its field the collapsing of the magnetic field.

Immediately thereupon the normally closed contact 10 that is provided in the primary circuit is opened by the armature 3.2 as the armature moves from its closing position near the energizing magnet (see FIG. 3). By this interruption of the primary circuit, there is induced in the secondary coil 5.2 a high voltage which produces an igniting spark between the electrodes 11 that are arranged in the secondary circuit. This spark ignites the lighter fuel that flows from the burner 12. The valve of the burner 12 is opened, when the starting lever 8 is pressed down, by means of a tension spring 13 and a lever 14 that is turnable about an axis 14.1.

When the starting lever 8 is released, the armature 3.2 will again return to its flux closing position. The lever 14 that is operably connected to the starting lever 8 permits the burner 12 to return then to its closed position.

As shown in FIG. 1, there is provided on the starting lever 8 an upward reaching extension 15 that has a bent piece 15.1 which reaches near the path of the ignition armature 3.2; this extension forms an operating member that tears the rotor 3.2 off the energizing magnet after the starting lever 8 has surpassed the predetermined position.

Normally, when the starting lever 8 reaches the predetermined position it will, with the aid of the spring 7, dislodge the armature 3.2 from its closing position. When this fails, the starting lever 8 will move past the predetermined position and only then will the operating member 15 dislodge the armature 3.2 from its closing position.

The operating member 15, as shown in FIGS. 2 and 3, reaches into a recess or cut-out 4.1 of the movable frame 4 which carries and guides the laminated armature. If the leaf spring 7 is disabled, the bent piece 15.1 of the operating member 15 will make contact with the edge 4.2 of the cut-out 4.1, whereby the armature 3.2 will immediately be torn off its closing position adjacent the energizing magnet.

As shown in FIGS. 2–7, there is provided for operating the starting lever 8 a handle 20 which is displaceably guided in the housing 21 of the magnetic igniter. As shown in FIG. 4, the handle 20 by its weight presses downwardly against the bearing surface 8.2 of the starting lever 8; the lever 8, as previously disclosed, rotates about the pivot 9. The bearing surface 8.2 of the starting lever 8 is of convex shape, to enhance the uniform contact between the handle 20 and the starting lever 8 during the entire path of the lever 8. The starting lever 8 and the handle 20 are held in their initial positions by a tension spring 22.

The handle 20 is slidingly guided by means of its broad contact surface 20.1 (see FIG. 5) on the outside of the wall of the housing 21 and has a central bridge 20.2 which protrudes through a guiding slit 23 of the housing 21. This bridge 20.2 has two slots 20.3 for receiving a bracket-like safety member or key 24 which, when inserted with its legs 24.1 into the bridge, lies closely to the inner surface of the wall of the housing 21, and assures in connection with the surface 20.1 safe guiding of the handle 20 on the wall of the housing 21.

The key 24 is U-shaped and each of its two legs 24.1 is provided with an inclined surface or edge 24.2. These inclined edges 24.2 are slanted in the direction of insertion (to the right in FIG. 5), to facilitate the insertion of the legs 24.1 into the slots 20.3.

Grooves or recesses 24.3 are provided that match the width of two connecting extensions of the bridge 20.3. The grooves 24.3 terminate the inclined edges 24.2 about midway of the legs 24.1 and provide for a safe connection of the key 24 to the bridge 20.2 of the handle 20; the key 24 is thus inserted with its legs 24.2 up to the recesses 24.3 into the slots 20.3 of the bridge 20.2.

The releasable latching engagement between the extensions of the bridge 20.2 and the recesses 24.3 is brought about by the brief yielding during insertion (see FIG. 7), of the only slightly protruding noses 24.4 of the recesses 24.3. The key 24 is composed of flexible material and hence the noses 24.4 can yield.

In the inserted position (FIG. 7), each of the extensions of the bridge 20.2 is disposed between a nose 24.4 FIG. 7), of the only slightly protruding noses 24.4 of the leg 24.2 of the key 24.

For the disconnection, it is sufficient to exert a slight pressure onto the noses 24.4, whereupon the noses 24.4 will slide into the bridge slots 20.3 so that the key 24 may now be detached from the handle 20 by simple removal of its legs 24.1 from the slots 20.3.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus described the invention, what I claim as new and desire to be secured by Letters Patent, is as follows:

1. A magnetic igniter, comprising a permanent magnet, an armature movable between a closed and an open position completing in the closed position with the magnet a closed magnetic flux circuit, said armature interrupting said magnetic flux circuit when near said open position, a primary electric circuit normally closed and operable to be interrupted and including a primary induction coil wound about a portion of said magnet and being operable to carry an electric current induced by said permanent magnet, a secondary electric circuit including spark electrodes and a secondary coil wound about a portion of said magnet, whereby there will be induced an electric current by said primary insert secondary circuit when said primary circuit, carrying a current, is interrupted, starting means operable to move said armature and to interrupt said primary circuit and comprising a starting member movable in opposite directions to and from an inactive position, an energy accumulator intermediate said starting member and said armature, said starting

member being operable, when moved in one direction away from said inactive to a predetermined position, normally to apply a force by means of said accumulator to said armature in the closed position thereof, the force received by said armature counteracting the holding force applied by the magnet to the armature in the closed position, whereby said armature will be torn off the closed position and be moved towards the open position when said force received surpasses said holding force, and an operating member in driven connection with said starting member and being movable therewith and operable to engage said armature in the closed position and to move it to the open position only after said starting member has been moved in said one direction beyond said predetermined position and had failed to move in said predetermined position said armature through said accumulator from the closed position of the armature, said starting member including a two-armed lever movable about a pivot, a housing, an actuator movably disposed on said housing and extending to the exterior of said housing and being operable to engage an arm of said lever thereby moving said lever about said pivot, said accumulator including a leaf spring connected with relation to said armature, the other arm of said lever normally engaging said leaf spring after said lever has been moved by said actuator about the pivot from its inactive position, said operating member being connected to said lever, said lever being operable to cause movement of said armature by said operating member off its closed position after said lever has been moved from its inactive position.

2. A magnetic igniter, as claimed in claim 1, said actuator including a handle shiftable on said housing between upper and lower positions and engaging said one arm of said lever during the downward movement until said armature has been moved to said open position.

3. A magnetic igniter, as claimed in claim 2, said handle having a surface engaging a surface of said arm, at least one of said surfaces having a convex shape.

4. A magnetic igniter, as claimed in claim 2, said housing having a slit, said handle including a bridge projecting through said slit of said housing, and a key releasably engaging said bridge inside said housing.

5. A magnetic igniter, as claimed in claim 4, said key comprising a U-shaped member having two legs, each leg having an inclined edge, said bridge having two slots, each slot receiving a leg, each leg having a recess, said bridge including two extensions, each near one of said slots and each being operable to engage releasably one of said recesses.

References Cited

UNITED STATES PATENTS

3,183,958	5/1965	Davies	317—81 X
3,246,207	4/1966	Remy	317—81
3,359,459	12/1967	Smith	317—81
3,369,157	2/1968	Remy	317—81 X

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U.S. Cl. X.R.

317—96; 431—255