Aug. 9, 1960 M. QUERCIA 2,948,134

LIGHTERS

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Fig. 5.

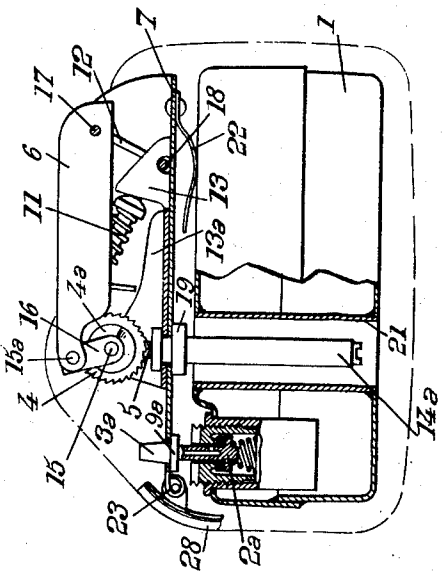


Fig. 6.

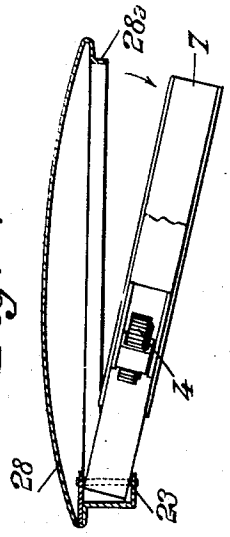


Fig. 2.

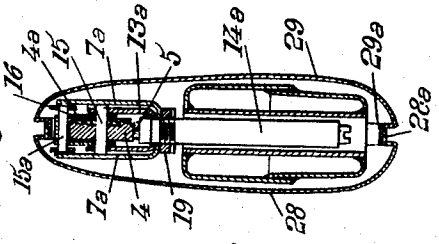


Fig. 4.

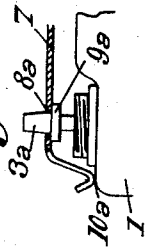


Fig. 1.

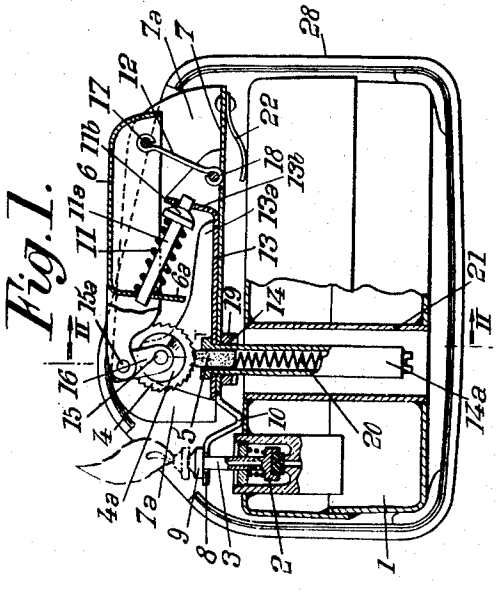


Fig. 3.



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Fig. 7.

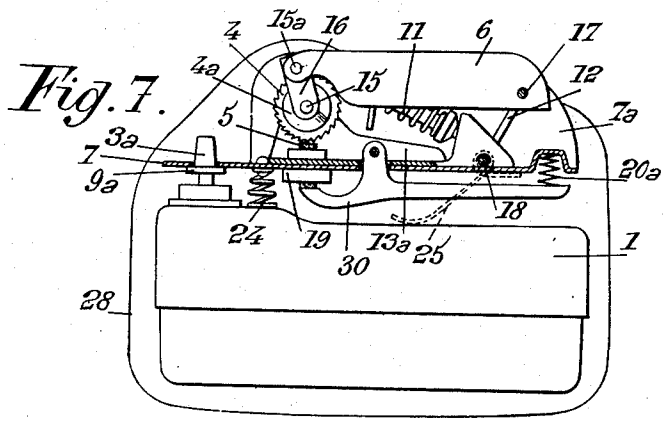


Fig. 8.

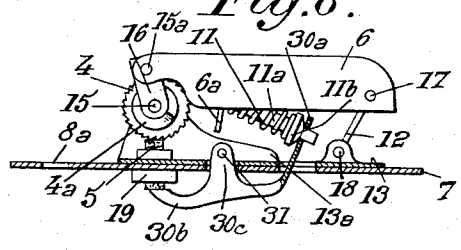
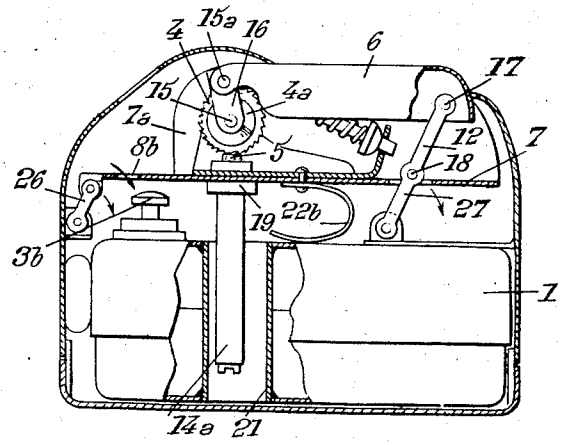


Fig. 9.



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2,948,134

LIGHTERS

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7 Claims. (Cl. 67—7.1)

The present invention relates to lighters including a reservoir housed in a casing and containing a liquefied gas under pressure, the feed of gas from said reservoir to a burner mounted thereon being controlled by means of a valve interposed between said burner and the inside of said reservoir, ignition of the gas stream flowing out from the burner being produced by an ignition mechanism adapted to project sparks toward the outlet of said burner.

The object of the present invention is to provide a lighter of this kind which is better adapted to meet the requirements of practice than those used up to this time.

For this purpose, according to this invention, said ignition mechanism is carried by a support movably mounted in said casing and operatively connected with said valve so as to open it in response to the initial movement of said support with respect to said casing which takes place when said mechanism is being operated, said mechanism being arranged to produce gas igniting sparks only subsequent to the opening of said valve by said initial movement of said support.

Preferred embodiments of the present invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example and in which:

Fig. 1 is an elevational view, partly in vertical section, of a lighter made according to a first embodiment of the invention.

Fig. 2 is a sectional view of the line II—II of Fig. 1.

Fig. 3 is a plan view of a detail of the same lighter.

Fig. 4 is a part view of a lighter made according to a modification.

Fig. 5 shows, in elevation with parts in vertical section, a lighter made according to another embodiment of the invention.

Fig. 6 is a plan view of some elements of the lighter of Fig. 5.

Fig. 7 is an elevational view with parts in vertical section of another embodiment of a lighter according to the present invention.

Fig. 8 shows, in elevational view, some elements of a lighter made according to another embodiment of the invention.

Fig. 9 is an elevational view with parts in vertical section of still another embodiment of the invention.

The lighter according to this invention, as illustrated by the drawings, includes a removable reservoir 1 containing a liquefied gas under pressure, such as butane, which can be allowed to flow out past a control valve 2 so as to be ignited at the outlet of a burner 3, ignition being produced by a mechanism including for instance a sparking wheel 4 adapted to cooperate with a flint 5, for instance of ferrocerium.

In lighters of this kind, the stem of valve 2 is often tubular so as to constitute at the same time the burner 3. According to the arrangement of the valve, opening thereof is obtained either by an axial pull exerted on

burner 3 (Fig. 1), or by an axial push exerted on a burner such as 3*a* (Figs. 4, 5 and 7) and 3*b* (Fig. 9).

There are lighters of this kind in which a control push-piece simultaneously actuates the sparking wheel and a forked lever capable of opening the control valve 3.

In such lighters, the forked lever is difficult to house and involves a complicated construction. Furthermore, the part of the rotation of the sparking wheel produced by the control push-piece before the opening of the control valve is lost as far as ignition is concerned.

In order to obviate these drawbacks, according to the present invention, the ignition mechanism, that is to say in particular flint 5, sparking wheel 4 and a push-piece 6 capable of actuating said sparking wheel 4 (preferably through ratchet-wheel means enabling push-piece 6 to come back into its initial position without driving sparking wheel 4), is carried by a support 7 movably mounted in the lighter casing so as to be able to have, under the action of push-piece 6 and before the beginning of the ignition operation, a displacement with respect to reservoir 1 which serves to open control valve 2.

In order to obtain this result return springs and/or levers suitably arranged for the desired purposes are provided between on the one hand push-piece 6 and support 7 and on the other hand support 7 and reservoir 1.

The movement of support 7 with respect to reservoir 1 may be a pivoting movement, a translatory movement or a combination of these two movements, as it will be hereinafter described.

In the embodiment of Fig. 1, where valve 2 is opened by exerting an axial pull on burner 3, this opening is obtained by a pivoting movement of support 7.

For this purpose there is provided, in the left hand end of the plate forming the base of support 7, a slot or notch 8 adapted to accommodate burner 3 below an enlarged portion 9 thereof, so that an upward movement of this end of support 7 pulls burner 3 upwardly. Said support 7 is pivoted on reservoir 1 about the bottom edge of an intermediate bent portion 10 of said support located between notch 8 and the portion of said support acted upon by push-piece 6.

Sparking wheel 4, the ratchet-wheel 4*a* through which it is rotated, push-piece 6, an arm 16 in the form of an inverted U through which the push-piece actuates said ratchet-wheel 4*a*, one end of a return spring 11 and the end of a link 12 pivotally connected with push-piece 6, are carried by a U-shaped member 13 the side wings 13*a* of which fit between the parallel side wings 7*a* of support 7. This U-shaped member 13 is applied against the base of support 7 by means of the guiding socket 14 of flint 5 and of a nut 19 screwed on this socket.

Said parts of the ignition mechanism are interconnected together by a plurality of spindles, namely spindle 15, about which sparking wheel 4, ratchet-wheel 4*a* and arm 16 are pivoted, spindle 15*a* through which push-piece 6 is pivotally connected with arm 16, and spindles 17 and 18 through which link 12 is connected on the one hand to push-piece 6 and on the other hand to support 7. These spindles are held between the two parallel wings 7*a* of support 7 with a slight play. In order to remove the mechanism, it suffices to unscrew nut 19 cooperating with socket 14.

The spring 11 which yieldingly opposes the movement of push-piece 6 toward the reservoir may be a helical spring. Advantageously, it is mounted on a guiding rod 11*a* the ends of which pass with a sufficient play through holes provided respectively in a bent portion 6*a* of push-piece 6 and in a bent portion 13*b* of member 13. The lower end of said rod is provided with an abutment flange 11*b* pushed by spring 11 against the portion 13*b* of member 13, the other end of the spring bearing against

the bent portion 6*a* of push-piece 6. Preferably, the face of flange 11*b* which bears against part 13*b* is of spherical shape.

In the embodiment of Fig. 1, socket 14 is provided with a downward extension 14*a* which contains the spring 20 which pushes flint 5 against sparking wheel 4. Reservoir 1 is provided with a recess 21, capable of receiving said extension 14*a* and sufficiently wide to permit the displacements thereof when support 7 is moved to open valve 2.

The under face of support 7 carries, fixed thereto, a return spring 22 which bears upon the top face of reservoir 1 so as yieldingly to oppose displacements of support 7 toward reservoir 1. Said resilient means 22 are weaker than spring 11.

The displacements of support 7 away from reservoir 1 are limited by the fact that said support comes into engagement with abutments formed in the casing of the lighter. Said casing is provided with holes, one for the passage of push-piece 6 and the other for the passage of the flame issuing from burner 3.

The operation of this burner is accomplished by manual operation of the actuating mechanism including push piece 6 and support 7 as follows:

The actuating mechanism is shown in Fig. 1 in inoperative position. When it is desired to operate the lighter, push-piece 6 is moved downwardly toward reservoir 1, spring 22 yields and support 7 pivots about the edge of the bent portion 10 thereof, thus pulling burner 3 upwardly and causing valve 2 to open. During this initial displacement there is no relative movement of push-piece 6 with respect to support 7. When the right hand end of support 7 (which carries spring 22) comes into contact with reservoir 1, push-piece 6 begins to move with respect to support 7 and causes link 12 to pivot in the clockwise direction, thus driving arm 16 and ratchet-wheel 4*a*. Sparking wheel 4 is then rotated in the same direction as said arm 16 and projects igniting sparks toward the jet of gas flowing out from burner 3, thus producing the flame. This flame remains as long as push-piece 6 is depressed to keep valve 2 opened. When push-piece 6 is released, all the parts with the exception of sparking wheel 4 (which is released by ratchet-wheel 4*a*) come back into their initial position under the effect of springs 11 and 22, and valve 2 is closed by the effect of its own spring.

In the modification illustrated by Fig. 4, the valve 2*a* of the reservoir is opened by a downward thrust exerted vertically on burner 3*a*. In this case, the notch 8*a* of support 7 is engaged above an enlarged portion 9*a* of the burner, and the bent portion 10*a* of said support 7 which bears upon the top of the reservoir is located on the left hand side of the burner. To be quite accurate, in this case 8*a* represents a hole rather than a notch.

In the embodiment of Figs. 5 and 6, support 7 instead of being provided with a bent portion such as 10 or 10*a*, is pivoted to the casing 28 about a spindle 23 carried by said casing.

The opening of the control valve may be obtained by a translatory displacement of support 7 with respect to reservoir 1.

In this case, an example of which is given by Fig. 7, two return springs such as 24 and 25 are interposed between support 7 and reservoir 1. Fig. 7 also shows a simplification which consists in dispensing with the tube 14*a* containing the spring 20 which pushes the flint against the sparking wheel.

According to another embodiment, support 7 is given a relative displacement with respect to reservoir 1 consisting in a combination of a translatory movement and a rotation movement. For this purpose, as illustrated by Fig. 9, support 7 is connected with the casing and the reservoir of the lighter through two connecting rods 26 and 27, respectively, capable of rotating as indicated by the arrows. Connecting rod 27 may be rigid with the link 12 above mentioned and form for instance an extension thereof. Advantageously, in this case, burner 3*b* has its top face in the form of a portion of a sphere against which the under face of support 7 comes into contact. Said support 7 is then provided with a hole 8*b* through which the gas flowing out from burner 3*b* can pass when the valve is opened.

In this embodiment, a single return spring 22*b* is sufficient.

The casing of the lighter will now be described.

Advantageously, as shown by the drawings and in particular by Figs. 1 to 3, this casing is made of two portions forming half-shells 28 and 29, and the line of assembly of these two portions is located substantially in the plane corresponding to the maximum section of the space limited by the casing. Generally, this line is located in the vertical plane of symmetry of the system constituted by the reservoir and the ignition mechanism.

Assembly of the two portions of the casing generally takes place by mutual engagement of flanges 28*a* and 29*a* which are slightly offset inwardly with respect to the periphery of the two half-shells 28 and 29.

Thus, when the two half-shells have been engaged on each other, there is provided in the casing a peripheral groove in which it is possible to insert a tool or a coin in order to separate the two half-shells from each other.

When the two half-shells are separated from each other, all the parts contained therein are quite visible and within easy reach.

In the embodiment of Figs. 5 and 6, support 7 is pivoted about an axis 23 carried by the portion 28 of the casing with a very considerable play, so that support 7 can be pivoted about a vertical axis (at right angles to the axis of spindle 23, as shown by Fig. 6), whereby the lower edge of the support can be moved to the outside of part 28, which permits an easy removal of the reservoir.

Advantageously the flint 5 is pushed against sparking wheel 4 by the return spring 11 of push-piece 6. For this purpose, the flange 11*b* of guiding rod 11*a*, instead of being applied against a fixed portion 13*b* as in Fig.1 is applied against one branch 30*a* (Fig. 8) of a lever the other branch of which 30*b* is acting upon flint 5.

The intermediate part of this lever is provided with two plates 30*c* which extend through support 7 and member 13 to be pivoted about a spindle 31 mounted in the wings 13*a* of said member 13. The branch 30*a* of the lever is curved upwardly and passes through a slot provided in the bottom parts of support 7 and member 13.

This arrangement, which is very simple, makes it possible to dispense with the tubular extension 14*a* of socket 14 and also with spring 20. Furthermore a recess, such as shown at 21 in the reservoir 1 of Fig. 1, is no longer necessary. The ignition mechanism works smoothly owing to the fact that flint 5 is pushed against the sparking wheel 4 with a pressure which is initially small and increases during the displacement of push-piece 6.

Of course, in order to apply flint 5 against sparking wheel 4, it is possible, as shown by Fig. 7, to make use of a lever 30 subjected to the action of a spring 20*a*, independent of the return spring 11 of push-piece 6.

The operation of the lighter shown by Fig. 7 takes place as follows:

When push-piece 6 is moved downwardly, support 7 is first moved in the downward direction but there is no relative movement of push-piece 6 with respect to support 7. The end of support 7 which surrounds the rod 3*a* of the burner then pushes said burner downwardly and opens the gas control valve. When support 7 has reached the end of this downward movement, push-piece 6 moves with respect to support 7 and causes rotation of sparking wheel 4 against the flint 5, thus producing ignition of the flame. When the push-piece is released, all the parts, with the exception of sparking wheel 4, come back to their initial positions; for instance push-piece 6 is moved with respect to support 7 by spring 11 and support 7 is moved with respect to the reservoir under the effect of springs

24 and 25. As for the gas control valve, it is returned into closed position by its own spring (not shown).

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. A lighter which comprises, in combination, a casing, a reservoir in said casing containing a liquefied gas under pressure, a burner mounted on said reservoir, a valve movable with respect to said reservoir for controlling the communication between the inside of said reservoir and said burner, an ignition mechanism for projecting igniting sparks toward streams of said gas allowed to flow out through said burner, a support for said ignition mechanism movably mounted in said casing, means operatively connecting said support with said valve for opening said valve in response to the displacement of a portion of said support in a given direction with respect to said reservoir, resilient means interposed between said reservoir and said support portion for yieldingly opposing such a displacement thereof, a push-piece movably connected with both said support and said casing, resilient means interposed between said support and said push-piece so that actuation of said push-piece urges said support portion to move in said direction, said last mentioned resilient means being stronger than said first mentioned resilient means, and means operatively connecting said push-piece with said ignition mechanism to produce gas igniting sparks in response to displacement of said push-piece with respect to said support effected against the resistance of said second mentioned resilient means.

2. A lighter according to claim 1 in which said valve is movable with a rectilinear translatory movement with respect to said casing and said support is pivotable in said casing about an axis fixed with respect to said casing and at right angles to the direction of movement of said valve.

3. A lighter which comprises, in combination, a casing, a reservoir in said casing containing a liquefield gas under pressure, a burner mounted on said reservoir, a valve movably carried by said reservoir for controlling the communication between the inside of said reservoir and said burner, a support movably mounted in said casing, resilient means for yieldingly holding said support in a given position with respect to said reservoir, said support being operatively connected with said valve so that displacement of said support from said position toward said reservoir causes said valve to be opened, a flint carried by said support, a sparking wheel journalled in said support about an axis and in contact with said flint to cooperate therewith to project igniting sparks toward streams of said gas allowed to flow out through said burner, an arm pivoted to said support about said axis, means for coupling said arm with said sparking wheel for one direction of rotation of said arm, a push-piece pivotally connected with said arm about an axis parallel to said first mentioned axis, a link pivotally connected at its ends to said push-piece and to said support respectively about axes parallel to said first mentioned axis so that a movement of said push-piece toward said support causes said arm to be rotated in said direction about said first mentioned axis, and resilient means for yieldingly opposing movement of said push-piece toward said support, said second mentioned resilient means being stronger than said first mentioned resilient means, whereby said support is first moved toward said reservoir and causes said valve to be opened before said push-piece operates said sparking wheel.

4. A lighter according to claim 3 including two connecting rods interposed between said casing and said support for movably mounting said support in said casing, the pivot axes of said connecting rods being parallel to said first mentioned axis of claim 3 and one of said connecting rods being rigid with said link.

5. A lighter according to claim 3 in which said support includes a bottom plate and two side wings at right angles thereto and to said axes, further including a member of U-shaped section fitted in said support, and means for removably securing said member in said support, said flint, said sparking wheel, said arm and one end of said second mentioned resilient means being directly mounted in said member.

6. A lighter according to claim 3 further including a lever pivoted to said support about an axis parallel to said first mentioned axis, said lever extending to the other side of said support from said push-piece, the end of said lever located on said last mentioned side of said support being in contact with said flint to urge it toward said sparking wheel, said second mentioned resilient means being interposed between the other end of said lever and said push-piece.

7. A lighter which comprises, in combination, a casing, a reservoir in said casing containing a liquefied gas under pressure, a burner mounted on said reservoir, a valve movable with respect to said reservoir for controlling the communication between the inside of said reservoir and said burner, an ignition mechanism for projecting igniting sparks toward streams of said gas allowed to flow out through said burner, a support for said ignition mechanism mounted in said casing movable from an inoperative position to a valve opening position and from there into a spark creating position, means operatively connecting said support with said valve for opening said valve in response to movement of said support from said inoperative into said valve opening position thereof, and means operatively connecting said support with said ignition mechanism for actuating the latter only in response to movement of said support from said valve opening into said spark creating position thereof, and means operatively connecting said support with said valve for opening said valve in response to the initial movement of said support taking place when said mechanism is being operated, said mechanism being arranged to produce gas igniting sparks only subsequent to the operation of said valve opening means, said casing being made of two half-shells assembled together along a line located in the plane of maximum section area of said casing, the adjoining edges of said two half-shells including inwardly offset flanges along which they are assembled together, and said support being pivoted to one of said half-shells about an axis at right angles to said plane but with a considerable play so that said support can be pivoted about an axis at right angles to said last mentioned pivot axis sufficiently to be brought to the outside of said last mentioned half-shell.

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