

May 9, 1950

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2,507,203

PYROPHORIC LIGHTER AND FLINT SUPPLY THEREFOR

Filed Nov. 23, 1948

3 Sheets-Sheet 1

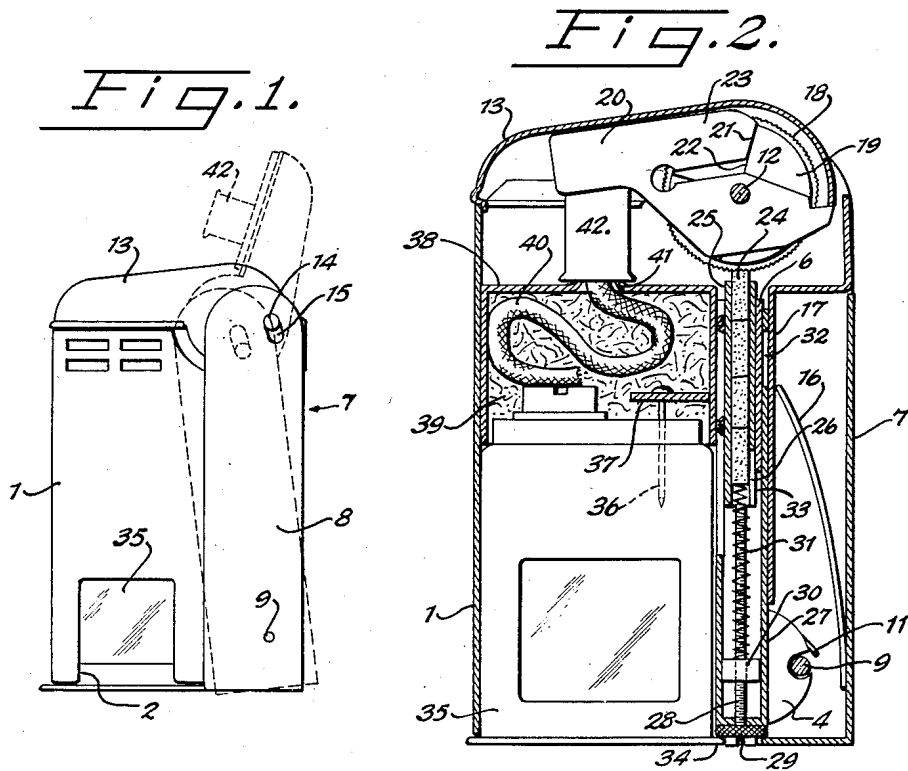


Fig. 3. Fig. 4.

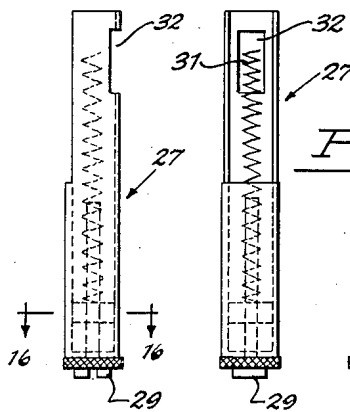


Fig. 6.

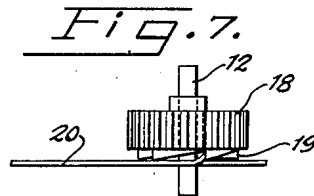


Fig. 5.

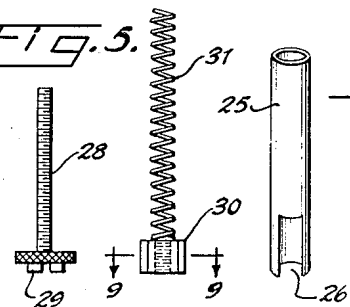


Fig. 8.

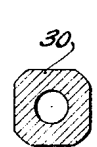


Fig. 9.

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Fig. 10.

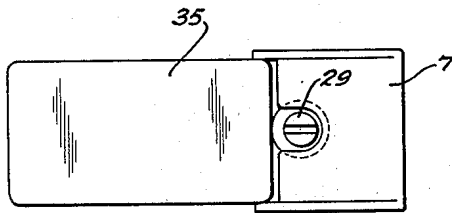
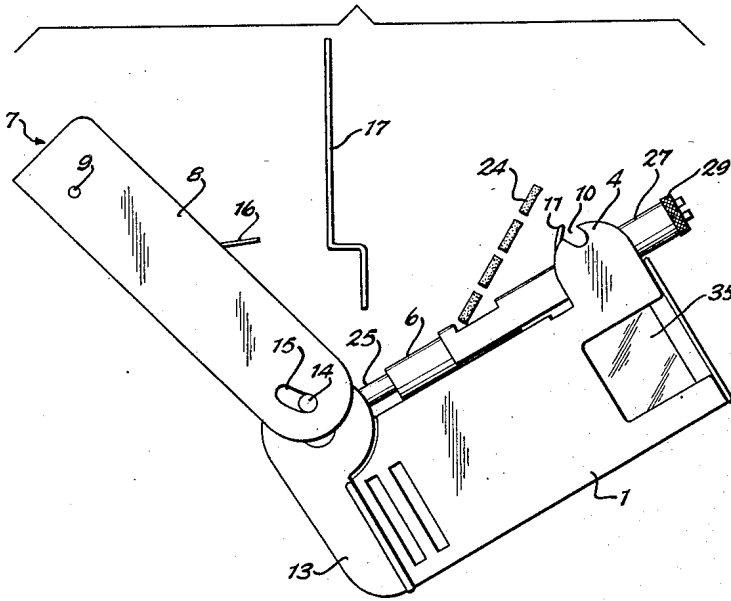


Fig. 11.

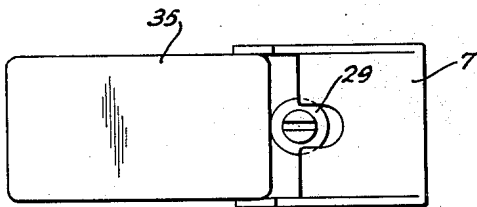


Fig. 12.

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Fig. 13.

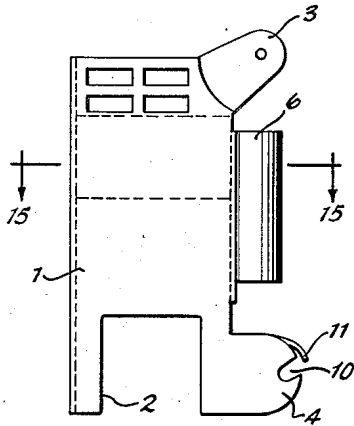


Fig. 14.

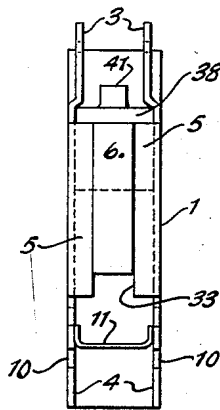


Fig. 15.

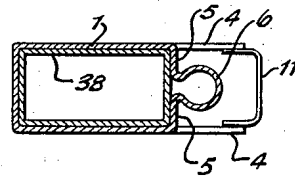


Fig. 16.

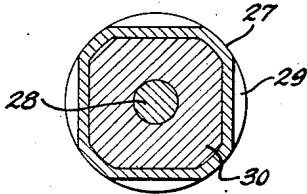


Fig. 17.

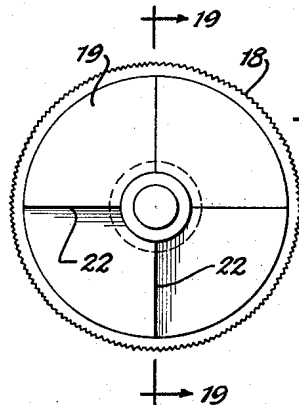
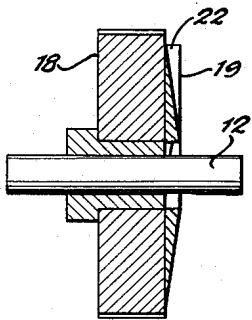
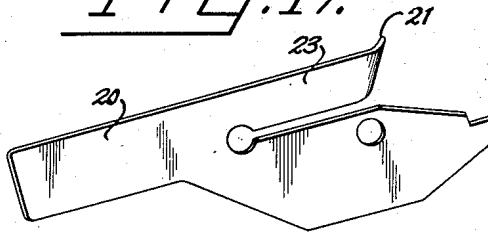


Fig. 18.

Fig. 19.

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UNITED STATES PATENT OFFICE

2,507,203

PYROPHORIC LIGHTER AND FLINT SUPPLY THEREFOR

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Application November 23, 1948, Serial No. 61,670

7 Claims. (Cl. 67-7.1)

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The present invention relates to pyrophoric lighters for cigarettes and the like.

The principal object of the invention is to provide such a lighter with a flint supply of such great capacity that the lighter may be operated over an extraordinarily long period of time before any new flint needs to be added.

A related object is to provide a lighter in which the length of flint remaining in operative position in the lighter can be readily ascertained at any time so as to avoid the possibility of the flint supply becoming unexpectedly exhausted.

Another object is to provide a lighter of the type indicated with means for applying to an individual, single flint, or a plurality of flints arranged in tandem, in operative position in a flint supply tube, a force which may be kept constant for most efficient pressure of the leading edge of the flint or of the uppermost flint of the series against the spark-striking wheel, regardless of the length of flint in the tube, and without requiring any portion of the force-applying element to project beyond the lighter casing.

Another object is to provide a flint-supply mechanism which will be immediately and readily capable of being opened for insertion of new flints.

Other objects are concerned with providing a simple, durable, inexpensive and foolproof mechanism for actuating the lighter to strike a spark and light the wick and thereafter to extinguish the light.

Other and further objects of the invention are inherent in and achieved by the preferred embodiment which is explained in the following description and is illustrated in the drawings forming part of this application for Letters Patent. This embodiment and the illustration and description thereof, and the advantages and the manner in which the foregoing and other objects of the invention are attained, will it is believed be sufficiently evident to those skilled in the art to which the invention relates.

The preferred embodiment, which has been reduced to practice and thoroughly tested and found to give complete satisfaction, is depicted in the drawings, in which

Figure 1 is a side elevational view of a complete lighter showing in broken lines the positions of the cap and operating lever when these parts have been moved to lighting position;

Fig. 2 is a generally longitudinal sectional view, on a relatively enlarged scale, taken on substantially the median plane of the longer dimension of the casing;

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Fig. 3 is a side elevational view of the tube which forms part of the flint supply means and contains the operating screw;

Fig. 4 is a side elevational view of the screw-containing tube, taken at a right angle to the view of Fig. 3;

Fig. 5 is a side elevational view of the operating screw;

Fig. 6 is a side elevational view of the nut and spring assembly which applies pressure to the flints;

Fig. 7 is a top plan view of the flint-striking wheel and the ratchet mechanism for driving it;

Fig. 8 is a perspective view of the flint tube;

Fig. 9 is a cross-sectional view, taken on the line 9-9 of Fig. 6, of the nut of the flint-feeding mechanism;

Fig. 10 is a side elevational view showing the lighter opened for insertion of flints;

Fig. 11 is a bottom plan view of the lighter casing with the parts closed, as shown in full lines in Fig. 1;

Fig. 12 is a bottom plan view of the casing with the parts opened, in lighting position, as shown in broken lines in Fig. 1;

Fig. 13 is a side elevational view of the main casing;

Fig. 14 is a rear elevational view of the main casing;

Fig. 15 is a cross-sectional view taken on the line 15-15 of Fig. 13;

Fig. 16 is a cross-sectional view, taken on the line 16-16 of Fig. 3 through the screw-containing tube;

Fig. 17 is a perspective view of the cap-opening plate;

Fig. 18 is a side elevational view of the spark-striking wheel and the ratchet wheel attached thereto; and

Fig. 19 is a diametrical sectional view taken on the line 19-19 of Fig. 18.

Generally speaking, the invention comprises a flint-containing tube or tube assembly in which a nut is led by rotation of an axially fixed screw to apply pressure through a spring to a flint or a series of flints arranged in tandem, the arrangement being such that the pressure can be kept constant through a long range of movement of the nut, involving no axial movement of the screw into or out of the casing which encloses it and all the rest of the mechanism.

The broad aspects of the invention include also the use of operating means to lift a cap and strike the spark which is actuated by compressing two relatively movable parts of the casing together

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against the resistance of a spring which thereafter asserts itself to close the cap, extinguish the flame and restore the parts to their original positions, from which the lighter can be opened for the insertion of a new flint supply.

The lighter of course includes a fuel supply, but this forms no part of the invention which is the claimed subject of this application. I have, however, shown in the drawings the type of fuel supply and related parts which is disclosed and claimed in my co-pending application Serial No. 61,669, filed November 23, 1948. To complete the explanation of the present invention some of the features of the flint supply and related parts will be referred to, but it is to be understood that the parts constituting the present invention, which relates to the flint supply and feeding means and to the mechanism for operating the lighter to ignite the wick and to extinguish the flame, may be combined with other and different types of fuel supply means.

As shown in Figs. 1 and 2, the presently preferred form of construction comprises a main casing made in the form of a generally box-like housing 1 having side walls and having an opening 2 at its bottom and an open top and back. The side walls have rearwardly projecting ears 3 at their top, and rearwardly projecting ears 4 at their bottom, as shown in Fig. 13. Between these upper and lower sets of ears the side walls of the main casing 1 are inwardly turned to form rear wall portions 5, which are rearwardly bulged to provide a substantially cylindrical ferrule 6 which is open at its top and bottom.

A supplemental casing 7 has a closed rear wall and bottom and a pair of side walls 8 which overlap the side walls of the main casing 1 and are pivoted to the lower ears 4 thereof by a pintle 9 which is normally held in slots 10 opening forwardly from the rear edges of the ears 4 by a small spring clip 11 which has its ends soldered to the ears 4 and bridges the space between them so that it can be sprung out of place for insertion of the pintle 9 in the slots 10 and can be deflected enough to release the pintle from the slots when the supplemental casing 7 is forcibly pulled out to the rear.

The upper ears 3 provide a bearing for a pintle 12 which pivots a cap 13 to these ears and hence to the main casing 1. This cap has, projecting from its side walls slightly to the rear of the pintle 12, a pair of trunnions 14 which are enclosed in short arcuate slots 15 formed in the side walls 8 of the supplemental casing 7. The trunnions occupy the upper ends of the two slots when the cap 13 is closed on the main casing 1, but are cammed down to the lower ends of the two slots when the supplemental casing is rocked, in the manner of a lever, to swing its upper end inwardly about the pintle 9 as a center or fulcrum. This camming action causes the cap 13 to swing open, about the pintle 12 as a center, as clearly appears from a comparison of the full and broken line positions of the parts in Fig. 1.

The trunnions 14 are normally kept seated at the upper ends of the slots 15, so that the cap 13 is kept closed on the main casing 1, and this position of the parts is maintained by the force of a leaf spring 16 which has its lower end soldered to the inner surface of the rear wall of the supplemental casing 7 and which has its upper end free to slide along a plate 17 which has an upper portion offset to the rear and projected in the plane of the back wall of the supplemental casing to close the gap between that wall and the

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rear of the cap. The lower portion of this plate 17 bears against the flint supply tube assembly inside the main casing, which forms an important part of the invention and will be explained hereinafter.

The cap 13 is generally dome-shaped, having a front bottom surface making a good fit with the top edge of the main casing 1 and having a rear portion arched and contoured appropriately for covering a striking wheel 18 which is mounted on the pintle 12 and has a toothed ratchet wheel 19 affixed concentrically to one of its two sides or made integral with the striking wheel. A plate 20 is fitted over the pintle 12 and housed within the cap 13 to swing with it and has a prong 21 projecting against the teeth 22 of the ratchet wheel 19 with yielding pressure produced by the resilient character of the tongue 23 at the end of which the prong is formed. The teeth 22 of the ratchet wheel are made in the form of radial shoulders, four in number, and the arrangement is such that when supplemental casing 7 is pressed into its broken line position of Fig. 1 the trunnions 14 will be cammed down to the bottoms of the slots 15 to swing the cap 13 through somewhat more than 90°, to the broken line position of Fig. 1, and this movement will swing the plate 20 and cause the prong 21 to engage one of the teeth 22 and turn the ratchet wheel and its attached striking wheel 18 clockwise, as shown in Fig. 2, through somewhat more than 90° of rotation. When the supplemental casing 7 is restored to its full line position of Fig. 1, by the action of the spring 16, the cap 13 is cammed back to its closed position and this movement carries the plate 20 back with the cap, with the prong 21 slipping counterclockwise along the side of the ratchet wheel 19 until the prong slips past and in front of the next adjacent shoulder which forms one of the teeth 22. Thus the striking wheel 18 is ratcheted through approximately a quarter of a turn, in a clockwise direction, each time the supplemental casing 7 is rocked to the left, as seen in Fig. 1, about its pivot 9.

A flint, as shown at 24 in Fig. 2, is arranged to be pressed against the periphery of the striking wheel 18, which is appropriately serrated or roughened, so that a spark will be struck each time the wheel is rotated as has been described.

One of the principal features of the present invention is the structure by which the flint 24 and preferably also a plurality of similar flints are mounted for engagement with the striking wheel and are fed thereto, and this structure will now be described.

Encased with the ferrule 6, and secured thereto by soldering or otherwise as indicated in Fig. 2, is a cylindrical flint tube 25 which is open at both ends and is long enough to hold a series of flints in tandem, for example the four flints shown in Fig. 2. The tube 25 extends down into the casing for about half of the casing length or depth, and it has a cut-out 26 entering from its bottom end and wide enough to admit one of the flints. Telescoped around the ferrule 6, in slidable, frictional contact, is the upper end portion of a screw tube 27 which may have its upper end portion made cylindrical in shape to make good fit with the outer surface of the ferrule, but which has its lower end portion made substantially square or otherwise polygonal in cross section. This lower end portion is closed at its bottom and is drilled to provide an unthreaded opening for a screw 28 which extends axially up into the tube 27 and has a slotted head 29 engaged with the outer surface

of the bottom wall of the tube. A nut 30, complementary in shape to the inner cross sectional shape of the lower portion of the tube 27, is threaded on the screw and is led up and down the screw by rotation of the screw head 29. A coil spring 31 is mounted on the upper face of the nut 30, encircling the screw 28 and compressible against the bottommost of the tandem series of flints 24 as the nut is led up the screw. The upper portion of the tube 27 is provided with a side opening 32 which is closed by the upper side wall of the flint tube 25 when the tube 27 is pushed fully up on the tube 25, but which will register with the cut-out 26 in the tube 25 when the tube 27 is pulled down, so that its lower end projects from the bottom of the main casing, as shown in Fig. 10. In this position of the openings 26 and 32, flints can be inserted successively through the registering openings into the tube 25.

It is to be noted that the ferrule 6 may have to be cut away at the rear side of its bottom, as shown at 33, so as to offer no obstruction to registering of the openings 32 and 26 through which the flints are inserted.

It is against the rear side of the tube 27 that the major portion of the plate 17 bears by the force of the spring 16.

The head 29 of the screw 28 is overlapped at one side by the inner margin of the bottom wall of the supplemental casing 7, as shown in Figs. 11 and 12. This overlap is sufficient to prevent undesired movement of the head from its position against the bottom wall of the tube 27 regardless of the position of the supplemental casing 7, as shown in Figs. 11 and 12, and of course it prevents also undesired withdrawal of the tube 27 from the casing.

The head 29 of the screw is overlapped also by the small flange 34 of a liquid fuel reservoir cartridge 35 which fits frictionally into the main casing 1, being insertible through the open bottom of the casing. This cartridge and its related parts form the subject of my co-pending application, but will be briefly described herein in order to complete the disclosure of the lighter.

The cartridge has a permeable top which is adapted to be punctured by a pointed pin 36 which depends from a bracket 37 soldered or otherwise secured to a top closure member 38 which is fixed in the upper portion of the main casing 1. This member 38 forms a pocket in the upper portion of the main casing which is filled with wadding 39 and contains a wick 40 extending upwardly through a nipple 41 in the top wall of the member 38. The arrangement is such that liquid fuel from the cartridge 35 can be discharged to the wadding 39 when the cartridge is withdrawn from the casing sufficiently to pull it from the pin 36 and thereby open the hole produced by the pin, after which the cartridge can be seated back in the casing with the pin filling the hole and the cartridge sealing the wadding compartment.

A snuffer cup 42 may be carried by the cap 13 so as normally to cover the wick and seal the nipple 41 to prevent evaporation of the fuel.

Flints are supplied to the flint tube by opening the lighter to the position shown in Fig. 10. This is accomplished by forcibly pulling the bottom portion of the supplemental casing 7 from the main casing 1, which causes the pintle 9 to snap past the spring clip 11, thus freeing the pintle from the slots 10, and permitting the supplemental casing 7 to swing about the trunnions 14 to the position shown in Fig. 10. Thereupon the

plate 17 is removed and the screw tube 27 is pulled out sufficiently to bring the openings 26 and 32 of the tubes 25 and 27 into register, so that flints 24 may be dropped through the openings and gravitated up into the flint tube 25. If necessary the fuel cartridge 35 may be pulled out slightly to permit the tube 27 to be withdrawn, and the nut 30 may be turned down to the bottom of the tube 27 so that the spring 31 will be lowered with it and will not obstruct the registering openings 26 and 32. It will be noted from Figs. 3 and 4 that the preferred length of the spring 31 is about equal to the distance between the bottom of the opening 32 and the top surface of the nut 30 when the nut is in the lower end of the tube 27.

When a full supply of flints has been inserted into the flint tube 25, the screw tube 27 is pushed back to fully seated position on the ferrule 6, the plate 17 is put back in place, and the supplemental casing 7 is swung back until the pintle 9 snaps past the spring clip 11 and seats in the slots 10. The lighter is thus restored to condition for a long period of operation so far as its ability to produce sparks is concerned.

It will be evident from the foregoing that the structure which has been described accomplishes all the objects hereinabove set forth. In this connection it is to be noted that the length of flint remaining at any time within the flint tube 25 can readily be ascertained by opening the parts to the position shown in Fig. 10 and making a visual inspection, or by simply pulling the screw head 29 out of the tube 27 and determining the position of the nut 30 on the screw 28 from which of course the length of flint above the spring 31 can be judged. In this way the possibility of the flint supply becoming unexpectedly exhausted is avoided.

It is to be noted also that not all the features or parts of the construction which has been described and illustrated are necessary to the invention, broadly considered, as defined in the broader of the appended claims.

I claim:

1. A pyrophoric lighter comprising a casing, a screw tube therein having a lower end portion polygonal in internal cross-section and having a side opening in its upper end portion, a screw axially positioned in the tube and rotatable from the lower end of the casing, a nut having a cross-sectional shape complementary to that of the tube, threaded on the screw, and adapted to be advanced and retracted in the tube when the screw is rotated, a flint tube telescopically related to the upper end portion of the screw tube, adapted to contain a plurality of flints in tandem and having a side opening in its lower end portion, a striking wheel mounted adjacent the upper end of the flint tube, a coil spring encircling the screw, extending into the flint tube and adapted yieldably to press the uppermost flint against the striking wheel, and means for normally holding the two tubes compressed so that said openings are out of register and are closed and for releasing the tubes to expand under the force of the spring to bring the openings into register for admission of flints.

2. A pyrophoric lighter as claimed in claim 1 in which the casing is formed in two portions and in which the combination includes means normally connecting the portions in hinged relation, said means being releasable so that the casing may be opened to expose said registered openings for insertion of flints.

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3. A pyrophoric lighter as claimed in claim 1 in which the casing is formed in two portions and in which the combination includes means normally connecting the portions in hinged relation, said means being releasable so that the casing may be opened to expose said registered openings for insertion of flints, and said flint tube being permanently secured to one of the casing portions and extending into the screw tube.

4. A pyrophoric lighter as claimed in claim 1 in which the casing includes a ferrule, the flint tube is permanently secured in said ferrule, and the screw tube is telescopically movable over said ferrule.

5. A pyrophoric lighter comprising a main casing portion containing a wick, a cap pivoted to the top of the main casing portion, a member permanently pivoted to the cap for swinging movement to move the cap to open and closed position relatively to the main casing portion, flint-feeding means within the main casing portion having an opening for insertion of flints normally covered by said member, and separable pivot means connecting the lower ends of the main casing portion and the member for said swinging movement, said separable pivot means comprising elements provided on the main casing portion and on the member respectively, and means normally maintaining said elements in pivoted relation; said last named means being releasable so that the member may be disconnected from the bottom of the main casing portion and may be swung about the pivot connecting the cap to the main casing portion to provide access to the flint-insertion opening.

6. A pyrophoric lighter as claimed in claim 5 including a striking wheel mounted on the main casing portion in operative relation to a flint fed

by the flint-feeding means and connected to the cap for rotation when the cap moves to open position.

7. A pyrophoric lighter comprising a casing having a main and a supplemental portion, means within the casing having an opening in its side for insertion of flints, said opening facing and being normally covered by said supplemental portion, means pivotally connecting the portions together at one end of each, and a cap permanently hingedly connected to the other end of said main portion and operatively connected to the other end of the supplemental portion so as to be rocked to open and closed positions relatively to the main casing portion when the two portions are swung relatively to each other on their pivotal connection, said pivotal connection including means normally maintaining the portions pivotally together; said last-named means being releasable so that the two portions may be swung apart about said hinged connection to provide access to the flint-insertion opening.

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