Jan. 16, 1934. L. V. ARONSON 1,943,505

PYROPHORIC LIGHTER ARRANGEMENT

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Fig. 1.

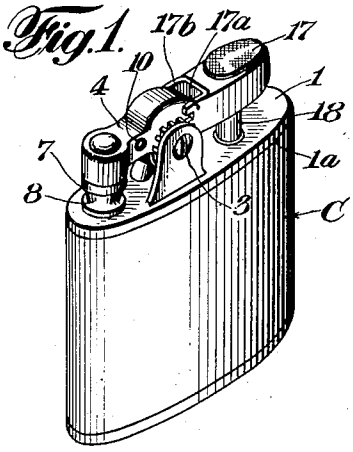


Fig. 2.

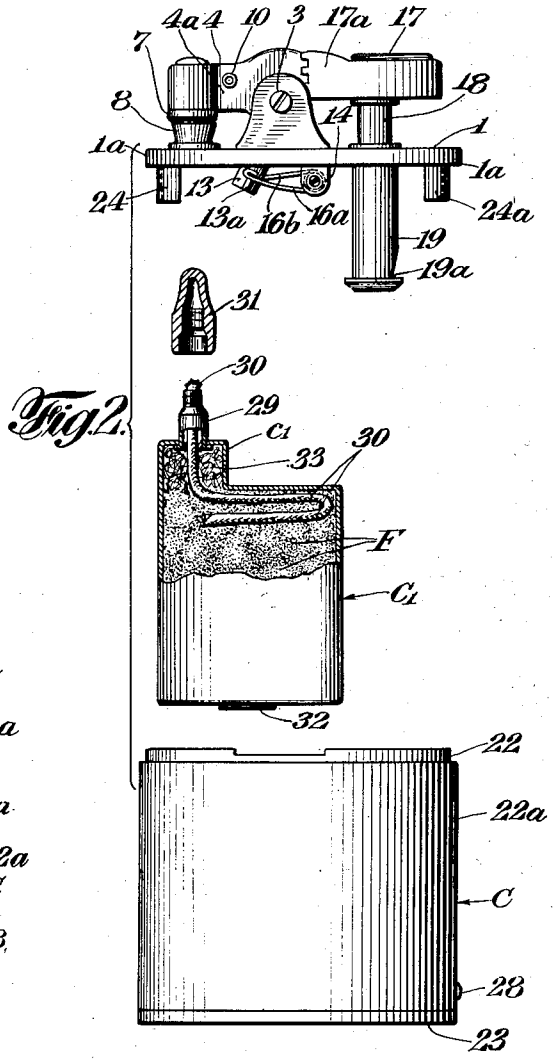


Fig. 3.

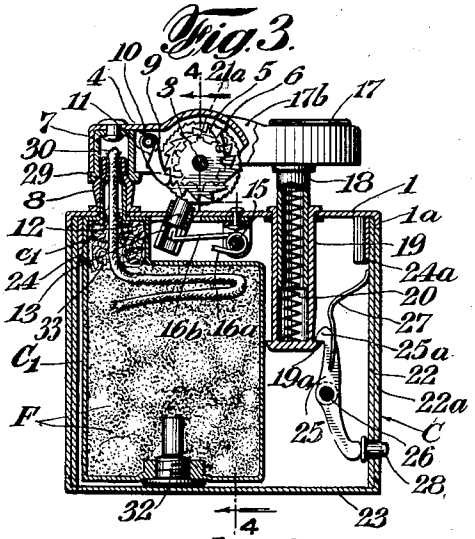


Fig. 4.

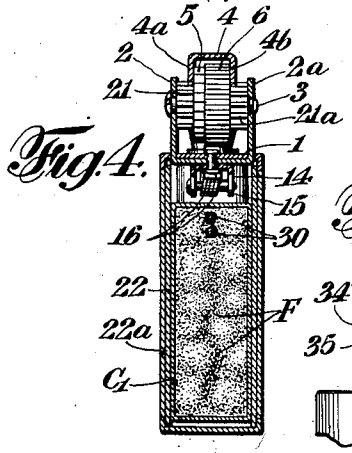


Fig. 6.

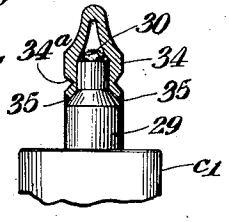
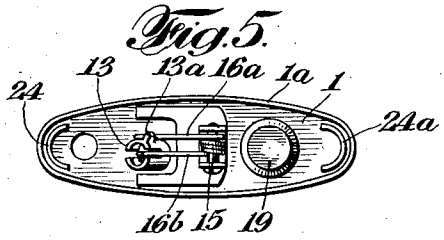


Fig. 5.



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Fig. 7

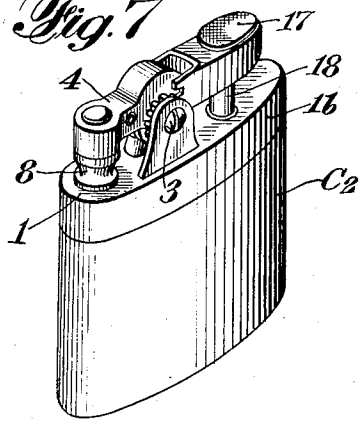


Fig. 8.

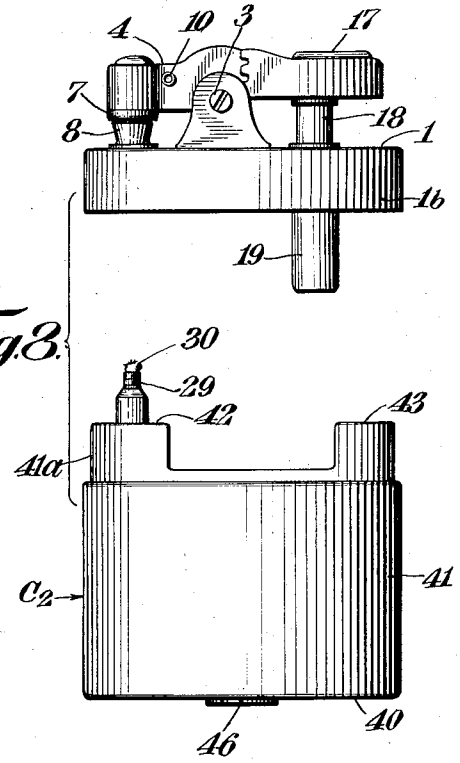
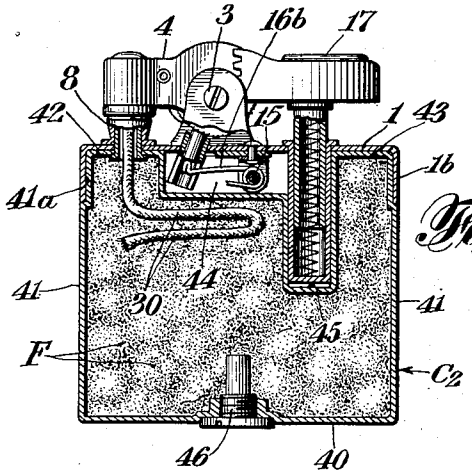


Fig. 9.



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UNITED STATES PATENT OFFICE

1,943,505

PYROPHORIC LIGHTER ARRANGEMENT

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Application April 11, 1930. Serial No. 443,269

5 Claims. (Cl. 67—7.1)

My invention relates to pyrophoric lighting mechanism and more particularly to a pyrophoric spark-producing device and associatable fuel containers.

My invention also relates to novel arrangements for supplying fuel to pyrophoric spark-producing mechanism.

My invention has further reference to pyrophoric spark-producing mechanism of novel character and particularly such as is readily detachable from and associatable with a fuel container.

Various other objects, advantages and characteristics of my invention will become apparent from the following description taken in connection with the accompanying drawings.

My invention resides in the pyrophoric spark-producing mechanisms, fuel containers and the novel combinations of such mechanism with a fuel container, features of construction and arrangement of parts of the character hereinafter described and claimed.

For an understanding of my invention and for an illustration of some of the many forms thereof, reference is to be had to the accompanying drawings, in which:

Figure 1 is a perspective view of pyrophoric lighting mechanism;

Fig. 2 is a side elevational view, partly in section, showing various parts of my novel construction in disassociated relation;

Fig. 3 is a vertical sectional view, partly in elevation, of the construction shown in Fig. 1;

Fig. 4 is a transverse vertical sectional view, partly in elevation, and is taken on the line 4—4 of Fig. 3 looking in the direction of the arrows;

Fig. 5 is a view looking at the bottom of the spark-producing mechanism shown at the top of Fig. 2;

Fig. 6 is a vertical sectional view, partly in elevation, showing a modified arrangement for sealing a fuel container;

Fig. 7 is a perspective view of a modified arrangement as constructed in accordance with my invention;

Fig. 8 is a side elevational view showing parts of the arrangement of Fig. 7 in disassociated relation; and

Fig. 9 is a vertical sectional view, partly in elevation, of the arrangement shown in Fig. 7.

Referring to Figs. 1–5, 1 represents a member or plate which may be oval, as shown, or of other suitable configuration. Upstanding from the plate 1 are spaced standards 2, 2*a* through which a pin or member 3 extends. Pivoted for movement about an axis defined by said member 3 is a member 4 having depending side walls 4*a*, 4*b*, Fig. 4. Side-by-side wheels 5 and 6 movable together as a unit are rotatably disposed on the member 3 and said wheels are positioned between the depending side walls of member 4. Carried by the member 4 at the otherwise free end thereof is a snuffer cap 7 coactable with a wick tube 8 carried by and projecting above the aforesaid plate 1.

The aforesaid wheel 5 is formed with peripheral ratchet teeth with which a pawl 9 is coactable, said pawl being preferably, but not necessarily, pivoted on a pin 10 extending transversely between the side walls of member 4 and said pawl being suitably biased toward and into engagement with the ratchet wheel 5, as by a spring 11, Fig. 3.

The aforesaid wheel 6 is serrated or roughened on its peripheral face so that it is coactable, for spark-producing purposes, with a pyrophoric element 12 which may in part project from a tube 13 carried by and extending through the aforesaid wall 1. Any suitable arrangement may be utilized for biasing the pyrophoric element 12 into engagement with the wheel 6. As herein shown, there is thus provided a bracket 14 which is secured to and depends from the plate 1, said bracket 14 carrying a transverse pin 15 on which a spring 16 is coiled. One end 16*a* of the spring 16 is suitably held in fixed position, as by engagement with a lateral extension 13*a* of the aforesaid tube 13, Fig. 2. The other end 16*b* of the spring 16 extends through a slot formed longitudinally in the tube 13 and engages the lower end of the pyrophoric element 12, said spring end 16*b*, when positioned as shown in Figs. 2 and 3, tending to swing in a clockwise direction due to the unwinding tendency of the spring 16, whereby the pyrophoric element 12 with considerable and a desired amount of pressure is held toward and in engagement with the periphery of wheel 6.

Any suitable arrangement may be utilized for actuating the wheel 6 to cause it, by coaction with the pyrophoric element 12, to produce sparks for fuel-ignition or flame-producing purposes. As herein illustrated, there is thus utilized a manually operable knob 17 having depending therefrom a stem 18 which is telescopically related to a cylinder or barrel 19 carried by and depending from the aforesaid plate 1. The stem 18 may be open at the bottom and the barrel 19 may be closed at its bottom whereby a suitable helical spring 20 may be utilized for biasing the stem 18 and knob 17 in an upward direction, Figs. 1,

2 and 3. The knob 17 comprises spaced members 17*a* and 17*b* extending toward the aforesaid member 3 and each equipped with rack teeth, the respective sets of which mesh with pinions 21, 21*a* rotatable on the member 3 and secured, in any suitable manner, to the member 4, for oscillatory movement therewith. As herein illustrated but not necessarily, the pinions 21, 21*a* are permanently meshed with arcuate, toothed segments of the respective side walls 4*a* and 4*b* in the manner disclosed in my copending application Serial No. 440,213, filed March 31, 1930.

The plate 1 constitutes a supporting member for the parts hereinbefore described which, as shown at the top of Fig. 2, form a unitary device utilizable for spark-producing purposes. As thus illustrated, the plate 1 may be held in one hand and knob 17 depressed in opposition to the expansive tendency of spring 20 whereupon the hereinbefore described sets of rack teeth coacting, respectively, with the pinions 21 and 21*a* cause the member 4 to swing clockwise, Fig. 2, the pawl 9 coacting with the ratchet wheel 5 to impart a step of movement to the latter and to the serrated wheel 6. Accordingly, the latter coacts with the pyrophoric element 12 to produce a shower of sparks which pass toward the now exposed upper end of the wick tube 8.

Upon release of pressure from the knob 17, the latter is elevated under the influence of spring 20 and the member 4 swings in a counter-clockwise direction, Fig. 2, until seated upon the wick tube 8. During such last named movement of the member 4, the pawl 9 idles with respect to ratchet wheel 5 and consequently the serrated wheel 6 remains stationary.

In accordance with the form of my invention shown in Figs. 1, 2, 3 and 4, the aforesaid plate 1 is adapted for detachable association with a casing C which per se is open at the top and comprises side wall structure 22 the same in horizontal cross-sectional configuration as that of the plate 1, said side wall structure 22 having a base 23 formed integrally therewith or secured thereto in any suitable manner.

The aforesaid plate 1, with the thereby-carried various parts of the spark-producing mechanism assembled thereon, is adapted for detachable association with the casing side wall structure 22 in any suitable manner, said plate 1, when thus associated, forming the detachable top wall of the casing C. This detachable relation may be obtained in any suitable manner such, for example, as herein illustrated wherein the plate 1 is shown as having a depending peripheral flange 1*a* adapted to be disposed over the upper end of the casing side wall structure 22. To enhance the rigidity of the connection, the plate 1 may be provided with depending sections 24, 24*a* disposed preferably at opposite ends of said plate 1 and suitably spaced from the respective adjacent sections of flange 1*a* whereby opposite ends of the casing upper side wall structure 22 may be received, respectively, between the depending flange 1*a* and one of the sections 24*a*. Preferably, the depending sections 24, 24*a* are conformable in contour with the adjacent sections of the side wall structure 22 so that a relatively close-fitting relation is obtained between the parts.

If desired, suitable latching mechanism may be utilized to more positively retain the plate 1 to the casing C. As herein shown, there is thus utilized a latch 25 pivoted on a member 26 extending laterally through and supported by the side wall structure 22, said latch 25 having a hook-shaped end 25*a* adapted to coact with a flanged surface 19*a* of the aforesaid cylinder 19, a suitable spring 27 coacting with the interior surface of the casing side wall structure 22 and with a slotted section of the latch 25 whereby the latter is biased counterclockwise, Fig. 3, to detachably retain the latch end 25*a* in engagement with the flange 19*a*. For swinging the latch 25 clockwise to disengage the parts, there may be utilized a knob 28 slidably mounted in the lower part of said side wall structure 22 and coactable with the otherwise free end of the latch 25.

With the parts related as shown in Fig. 3, the plate 1 is firmly and securely held to the casing C. This is true because the latch 25 coacts with the cylinder 19 to positively prevent removal of said plate 1 from the casing C. The flange 1*a* is flush against the upper exterior surface of the casing side wall structure 22 and greatly prevents side sway of any character as regards the plate 1. Furthermore, the depending sections 24, 24*a* of the plate 1 are disposed flush against upper interior surfaces of the casing side wall structure 22 to more effectively retain the plate 1 in the desired position on the casing C. Accordingly, with the parts thus related as shown in Fig. 3, it results that the plate 1, in effect, is substantially a unitary part of the casing C. Due to this condition, the spark-producing elements are operable as satisfactorily as with those constructions of the prior art wherein the supporting plate for such elements forms an integral part of or is soldered to the fuel casing.

To detach or remove the plate 1 from the casing C, it is only necessary to apply pressure to the member 28 whereupon the hook-shaped latch end 25*a* is separated from the flange 19*a* of cylinder 19. When these parts are thus disengaged, the plate 1, together with the thereby-carried parts of the spark-producing mechanism, may readily be manipulated to detach them from the casing side wall structure 22. To reassociate the plate 1 with the casing side wall structure 22, it is only necessary to arrange it in proper relation on the top of said side wall structure, the hook-shaped latch end 25*a* coming into latching relation with respect to the cylinder flange 19*a* in an automatic manner.

As shown in Figs. 2, 3 and 4, the casing C is adapted to receive a supplementary casing C1, the latter containing a suitable amount of fuel F which may be liquid in character but, as shown and preferably, is semi-solid or jelly-like such, for example as is disclosed in the copending Nathan Proper application Serial Number 342,306, filed February 23, 1929. Ordinarily, the casing C1 is a re-fill casing and, hence, is discarded after the fuel is exhausted therefrom. However, if desired, said casing C1 need not be discarded since it may be more or less permanently associated with the casing C and the supply of fuel therein replenished as desired.

The supplementary casing C1 may be formed of any suitable material such, for example, as sheet material and, more particularly, sheet metal. Said supplementary casing C1, in the example shown but not necessarily, is adapted to be disposed within the main casing C after the plate 1 has been removed from the latter. Preferably, the width of the casing C1 should be such that it is snugly receivable in that part of the casing C to the left of the cylinder 19, Fig. 3.

In accordance with an important phase of my invention, the casing C1 carries or comprises an upstanding tubular member or sleeve 29 which is

suitably secured, preferably but not necessarily, to the top wall of an upper extension casing c1 of the casing C1 whereby the passage through said tubular member 29 communicates with the interior of said casing C1. A suitable wick 30 disposed within the casing C1 extends through the extension casing c1 and then through the aforesaid tubular member 29, the upper end of said wick 30 preferably projecting slightly above the upper end of the tubular member 29, Fig. 2.

Assuming that the plate 1 has been detached from the casing C and the latter is without a supply of fuel, the fuel-containing casing C1 of Fig. 2 may be disposed interiorly of said casing C so as to obtain an arrangement substantially as shown in Fig. 3. Thereupon, the plate 1 may be attached to the casing side wall structure 22 in the manner hereinbefore described and, in so doing, the wick tube 8 is telescoped upon the tubular member 29; the interior surface of said wick tube 8 and the exterior surface of said member 29 being so fashioned that this result may be attained. When all of the parts are thus related, they appear as shown in Fig. 3, wherein the tube 13, spring 16 and related parts are disposed in the space at one side of the extension casing c1 and inflammable material from within the fuel-containing casing C1 comes to the upper exposed end of wick 30 which now projects slightly above the wick tube 8. Accordingly, by depression of the knob 17, sparks are produced as hereinbefore described, said sparks producing flame at said upper end of wick 30, the latter being now exposed because the snuffer cap 7 has been elevated therefrom. Upon release of pressure from the knob 17, the parts return to the position shown in Fig. 3 under the influence of spring 20, the snuffer cap 7 returning to engagement with the wick tube 8 to thereby extinguish the flame and to close the passage leading into the interior of the fuel casing C1.

The degree of rigidity with which the plate 1 is held to the casing C is further enhanced by reason of the telescopic relation into which the wick tube 8 and tubular member 29 are brought. This follows because the fuel casing C1, to some extent in a frictional sense, is anchored interiorly of the casing C and, accordingly, the extension member 29 thereof coacts with the wick tube 8 in a desired manner to promote the rigidity with which said plate 1 is held to the casing C.

It is intended that fuel-containing casings such as the herein-described casing C1 shall be sold on the market and that the user of the lighting mechanism, when the fuel is exhausted from that fuel casing then associated with his lighting mechanism, shall operate the member 28 whereupon the plate 1 may be detached from the casing C; thereupon, the therein-contained empty casing together with the associated wick 30 and the tubular member 29 may be discarded and a new duplicate casing purchased, the latter being filled with fuel and having a tubular member 29 through which an unused wick extends; the new casing may then be inserted in the main casing C whereupon the plate 1 may quickly and easily be secured, as hereinbefore described, in operative position on said main casing with the new tubular member 29 extending through the wick tube 8.

One form of a suitable supplementary fuel-containing casing C1 adapted for sale on the market is shown in Fig. 2. This casing is the same as disclosed in Fig. 3, but, in addition, has a closure cap 31 suitably secured thereto, as by threads formed exteriorly on the upper surface of the tubular member 29. While in storage or on display in stores, the provision of the cap 31 is desirable because preventing evaporation of fuel along the wick 30 and through the passage of tubular member 31.

The fuel F may be disposed within the casing C1 in any suitable manner. It may be sealed therein somewhat the same as material is sealed into ordinary collapsible tube-like containers or as shown, said casing C1 may be formed with an opening in its bottom wall, for example, through which the fuel is inserted and which is suitably closed, as by a threaded plug 32, Fig. 3. Obviously, in lieu of the arrangements thus described, fuel may be introduced into the casing C1 in any other suitable manner.

An important advantage of re-fill fuel casings as constructed in accordance with my invention resides in the fact that the user of the lighter mechanism obtains a new wick with each fresh supply of fuel. The presence of an unclogged wick in the lighter mechanism is desirable and, moreover, adjustments as to wick height above the wick tube are not so often required. It shall be understood, however, that my invention is not to be limited to the permanent association of a wick with each re-fill casing since the lighting mechanism may have a wick more or less permanently associated therewith for repeated use with subsequent supplementary fuel-containing casings.

As shown particularly in Figs. 2 and 3, the fuel-containing casing C1 and preferably the extension casing c1 thereof may contain a mass 33 of suitable absorbent material, as cotton. The use of such absorbent material is sometimes desirable but it shall be understood that my invention is not to be limited thereto.

Further, it shall be understood that my invention is not to be limited to the utilization of a cap 31 for sealing the casing C1 during non-use thereof. This follows because a variety of other suitable arrangements may be utilized for this purpose, some involving a cap and some being free from any cap construction. As one example of an alternative arrangement for this purpose, there is shown in Fig. 6 a cap-like member 34 which is soldered at 35 or otherwise suitably secured to the tubular element 29. The cap-like member 34 may be provided with a channel 34a to facilitate severance of the upper cap section, by a knife or the like, just before the supplementary fuel casing is to be inserted interiorly of the main casing.

When the pyrophoric element 12 becomes worn to such extent that a new one is required, or when repairs are necessary, the plate 1 may be detached from the casing C whereupon, by suitable manipulation of the spring end 16b, the worn pyrophoric element may be removed for repair or replacement purposes. Thereafter, the plate 1 may readily be attached to the casing C to restore the lighter mechanism to operative condition.

Although the use of the disclosed construction involving the detachable plate 1 is desirable because opening the casing C for re-fill purposes and further, because exposing the pyrophoric element and its biasing mechanism for manipulation when a new pyrophoric element is required, it shall be understood that the invention is not limited to the utilization of a detachable plate 1 such as disclosed herein or one generally the equivalent thereof. This is true because other

arrangements may be utilized for replacement of pyrophoric elements and also other arrangements may be utilized for gaining access to the main casing C so that a new re-fill casing C1 may be substituted for an empty one.

As hereinbefore stated, the use of semi-solid or jelly-like fuel F is desirable. It shall be understood, however, that re-fill casings C1 may contain liquid fuel rather than semi-solid or jelly-like fuel, if desired.

As hereinbefore stated, the casing C comprises side wall structure 22 and, as herein shown, such side wall structure 22 is of double thickness and, therefore, comprises an outer wall surface 22*a*. If desired, this outer wall surface 22*a* may be constituted by a sleeve-like member such as described and claimed in my copending application Serial No. 440,213, filed March 31, 1930. However, the use of such a supplementary wall surface 22*a* is entirely optional and may be dispensed with, if desired.

Referring to Figs. 7, 8 and 9, there is illustrated a modified form of my invention wherein a suitable casing C2 is adapted for association with the hereinbefore described plate 1.

As shown but not necessarily, the casing C2 comprises a base 40 from which upstands side wall structure 41 preferably the same in horizontal cross-sectional configuration as that of the plate 1, the casing top wall comprising surfaces 42 and 43 preferably disposed in alinement and said casing top wall further being reentrant so as to form chambers 44 and 45, the chamber 44 extending, preferably, entirely across the casing and the chamber 45 having a pocket extending thereinto.

Preferably, the plate 1, instead of the aforesaid flange 1*a* of narrow depth, is provided with a flange 1*b* of much greater depth and said last named flange is adapted to be slidable upon, closely embrace and frictionally engage the top surface of the casing side wall structure 41, lower surfaces of the plate 1 assuming a face-to-face relation with respect to the surfaces 42 and 43 of the casing top wall. If desired and as shown in Figs. 8 and 9, the upper casing side wall structure 41 may be reduced in cross-section at 41*a* for the reception of the flange 1*b* so that exterior side surfaces are substantially smooth and even.

With the parts in disassociated relation as shown in Fig. 8, the plate 1 together with the thereby-carried spark-producing elements may be more or less securely and rigidly associated with the casing C2 by telescoping the flange 1*b* upon the upper part of the casing side wall structure 41. In so doing, the cylinder 19 enters the chamber pocket 45 while the chamber 44 receives the tube 13, spring 16 and associated parts, and said flange 1*b* forms a closure wall for said chamber 44.

As shown, the casing C2 is provided with a tubular member or sleeve 29 and a wick 30 the same as heretofore described in connection with the casing C1. In the example shown, the tubular member 29 is carried by and projects above the casing wall surface 42; hence, said tubular member 29 becomes detachably disposed interiorly of the wick tube 8 when the plate 1 is associated with the casing C2.

The casing C2 contains a body of fuel F preferably, but not necessarily, jelly-like as hereinbefore described. By the wick 30, such fuel is fed to the ignition region above the wick tube 8 where it may be ignited by sparks pyrophorically produced when the knob 17 is depressed.

Fuel may be suitably introduced interiorly of the casing C2 as by introduction through a filling opening normally closed by a threaded plug 46 or the like. However, it shall be understood that the supply of fuel may be obtained in said casing C2 in any other suitable manner.

In the example shown, the casing C2 is intended to function as the main casing of the lighting mechanism. Hence, its wall structure should be formed of relatively stiff material such, for example, as is not deformable by ordinary manual pressure.

If desired, a casing C2 may be used more or less permanently with a plate 1 and the thereby-carried spark-producing mechanism, fuel being suitably supplied to said casing C2 when necessary, as by passage through the opening normally closed by the plug 46, or equivalent.

Alternatively, if desired, the casing C2 may be discarded when the fuel supply therein is exhausted, a new duplicate casing filled with fuel and having an unused wick being obtained for association with the plate 1.

In the example shown, the plate 1 is positively and securely retained to the casing C2. This follows because the flange 1*b* should be designed for tight frictional engagement with the adjacent section of the casing side wall structure 41. Moreover, the tubular member 29 should frictionally engage the wick tube 8, as should the cylinder 19 with respect to the casing surface defining the pocket 45. However, the plate 1 is preferably readily detachable by manual effort when it becomes desirable to associate a new fuel casing therewith or to inspect the pyrophoric element 12.

If desired, the casing C2 (and the casing C1) may carry, in lieu of the herein described tubular member 29, a tubular structure such as disclosed at 23 in my copending application Serial No. 440,214, filed March 31, 1930, in which case, the plate 1 would be constructed without a wick tube.

Although I have described the form of my invention shown in Figs. 7, 8 and 9 in connection with a particular type of spark-producing mechanism, i. e., such as specifically described in connection with Figs. 1–5 herein, it shall be understood that my invention is not to be so limited and that any suitable form of spark-producing mechanism may be utilized.

While the invention has been described with respect to certain particular preferred examples which give satisfactory results, it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended, therefore, in the appended claims to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent, is:

1. In combination, a main casing having a top wall, pyrophoric flame-producing mechanism carried by said top wall, a fuel-containing casing structure interiorly of said main casing, said casing structure comprising an upper extension casing of substantially less area in horizontal section than the lower casing structure, and a wick projecting from said casing structure and extending through said top wall, parts of said mechanism being disposed in said main casing at the side of said extension casing and above the lower casing structure.

2. In combination, a main casing having a top wall, a wick tube defining a passage through said top wall pyrophoric flame-producing mechanism carried by said top wall, a fuel-containing

casing structure interiorly of said main casing, said casing structure comprising an upper extension casing of substantially less area in horizontal section than the lower casing structure, and a sleeve-enclosed wick projecting from said casing structure and extending through said wick tube, parts of said mechanism being disposed in said main casing at the side of said extension casing and above the lower casing structure.

3. In combination, a main casing having a detachable top wall, pyrophoric flame-producing mechanism carried by said top wall, a fuel-containing casing structure interiorly of said main casing, said casing structure comprising an upper extension casing of substantially less area in horizontal section than the lower casing structure, the area in horizontal section of said lower casing structure being substantially less than that of said main casing to thereby define a space interiorly of said main casing, a wick projecting from said casing structure and extending through said top wall, parts of said mechanism being disposed in said main casing at the side of said extension casing and above the lower casing structure, and means in said space for detachably retaining said top wall on said main casing.

4. In combination, a main casing having a detachable top wall, pyrophoric flame-producing mechanism carried by said top wall, a fuel-containing casing structure interiorly of said main casing, said casing structure comprising an upper extension casing of substantially less area in horizontal section than the lower casing structure, the area in horizontal section of said lower casing structure being substantially less than that of said main casing to thereby define a space interiorly of said main casing, a wick projecting from said casing structure and extending through said top wall, the biasing spring for the pyrophoric element of said mechanism being disposed in said main casing at the side of said extension casing and above the lower casing structure, and means in said space for detachably retaining said top wall on said main casing, said means comprising a latch coactable with a chamber-forming member of said mechanism.

5. In combination, a main casing, a plate detachable from said main casing and forming the top wall thereof, means interiorly of said main casing for retaining said plate thereon, pyrophoric flame-producing mechanism both above and below said plate and carried thereby, said mechanism comprising a wick tube upstanding from said top wall, and a supplementary fuel-containing casing insertable into said main casing through the open top thereof and carrying a wick which extends through said wick tube.

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