

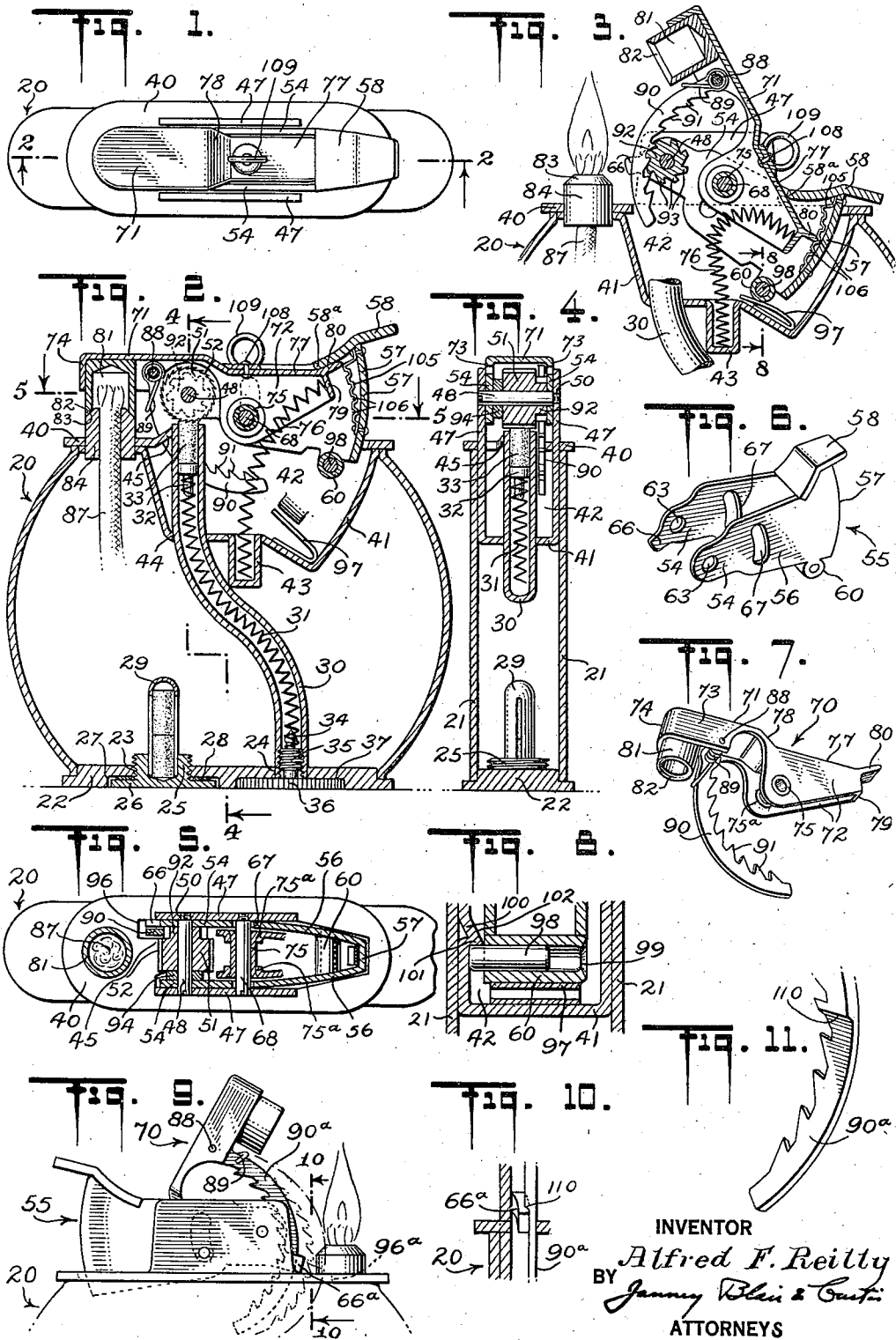
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LIGHTER CONSTRUCTION

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## LIGHTER CONSTRUCTION

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This invention relates to lighting devices, and more particularly to a device in which a wick is ignited by sparks mechanically produced.

One of the objects of the invention is to provide a device of the character indicated which shall be of inexpensive construction and absolutely reliable in operation. Another object of the invention is to provide an efficient and practical lighter mechanism which may easily be assembled. Another object of the invention is to provide a device of the character described which optionally may be kept burning without holding the finger-piece. Another object of the invention is to provide a device of the character described which may be caused to automatically close extinguishing the flame when manipulated in a certain way, and which will remain open with the wick lighted when manipulated in another way. Another object of the invention is to provide a device of the character described which insures the exertion of a strong pressure on the part of the user. Another object of the invention is to provide a device of the character described which makes a clicking noise when being operated. Another object of the invention is to provide a device of the character described which requires less pressure towards the end of the lighting stroke than it does at the commencement thereof. Another object of the invention is to provide a device of the character described which may be locked in open or lighted position and which then may be quickly and easily snapped shut extinguishing the flame. Another object of the invention is to provide a device of the character described in which leakage of fuel is greatly reduced. Another object of the invention is to provide a device of the character described adapted to be connected to a watch chain. Another object of the invention is to provide a device of the character described which may be easily manipulated while attached to a watch chain. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, as will be exemplified in the structure to be hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which is shown one of various possible embodiments of the mechanical features of this invention,

Figure 1 is a plan view of a lighter constructed in accordance with the invention;

Figure 2 is a vertical sectional view taken on the line 2-2 of Figure 1;

Figure 3 is a fragmentary vertical sectional view similar to Figure 2 and showing the snuffer of the lighter raised and the finger-piece thereof depressed;

Figure 4 is a vertical sectional view taken on the line 4-4 of Figure 2;

Figure 5 is a horizontal sectional view taken on the line 5-5 of Figure 2;

Figure 6 is an isometric view of the finger-piece member;

Figure 7 is an isometric view of the snuffer member and toothed member;

Figure 8 is a fragmentary sectional view on an enlarged scale taken on the line 8-8 of Figure 3;

Figure 9 is a fragmentary side elevation of a modified form of lighter;

Figure 10 is a fragmentary sectional view taken on the line 10-10 of Figure 9; and

Figure 11 is an isometric view on an enlarged scale of the toothed member according to the modification of Figures 9 and 10.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring now more particularly to Figures 2 and 4, I provide a fuel tank 20 which preferably has substantial bulges at each end, and may consist of a pair of shells 21, 21 suitably fastened together as by solder, the shells 21 being susceptible of production in quantity by pressing them out of sheet metal with a die. The fuel tank 20 has a bottom wall 22 having a pair of orifices 23 and 24. The orifice 23 is threaded and is normally closed by means of a threaded closure plug 25 having a disc-like bottom 26 provided with a knurled edge. The disc portion 26 fits in a depression 27 provided for it. Liquid fuel is introduced into the tank 20 through the orifice 23 which thereafter may be closed by the closure 25, a leather washer 28 being provided in the depression 27 to form a tight seal. In order to permit ready manipulation of the disc portion 26 to open the orifice 23, the knurled edge of the disc portion 26 may extend beyond the edges of the bottom wall 22, or any other suitable expedient may be adopted, such as forming a screw slot in the disc 26.

The threaded portion of the closure 25, as is clearly shown in Figure 2, is hollow and receives a container 29 for extra pieces of pyrophoric metal. As is better shown in Figure 4, the container 29 may comprise a cylindrical member split down the center with a closed top, as such a mem-

ber is adapted to be frictionally held in the hollow portion of the closure 25 by reason of the tendency of its side walls to expand.

Again referring to Figure 2, the orifice 24 has  
5 secured in it, desirably by solder, the lower end of a tube 30. The tube 30 contains a spring 31 the upper end of which is coiled about the shank of a plunger 32 engaging a piece 33 of pyrophoric metal or other substance adapted to produce  
10 sparks. The bottom end of the spring 31 is coiled about a knob 34 formed on the upper end of a threaded member 35 adapted to be screwed into the lower end of the tube 30 which is internally threaded for that purpose. The threaded member 35 has a knurled disc portion 36 adapted to  
15 seat in a recess 37 and any suitable expedient may be adopted for permitting the ready turning of the disc 36, as in the case of the disc 26, for the removal of screw 35, spring 31 and plunger 32, for the purpose of replacing a completely or partially used piece of pyrophoric metal with a fresh piece.

Referring now to Figures 2 and 4, the top of the fuel tank 20 is sealed by a top wall flange portion 40 which may be secured to the fuel tank  
25 by solder. Extending downwardly from the top wall flange portion 40 and desirably also soldered to the shells 21 as well as to the top wall flange portion 40 are the walls of a member 41 which forms a somewhat irregular-shaped well 42, the sides and bottom of the well 42, the flange 40 and a short capped tube 43, the purpose of which will be hereinafter made apparent, forming the upper  
30 closure for the fuel tank 20.

The tube 30 extends through an opening 44 in the bottom wall of the member 41 and the upper end of the tube 30 is supported by a platform 45 extending inwardly from the flange 40. The tube 30 is made fast to the platform 45 and the opening 44 is sealed against the escape of fuel by soldering or in any other suitable manner.

Desirably integrally formed with the member 41 are a pair of upwardly extending side members 47, 47 which are best shown in Figures 1 and 4.  
45 Extending between these side members 47, 47 and near the front thereof is a shaft 48, one end thereof being threaded and the other end having a slot therein. The threaded end of the shaft 48 fits in a threaded hole 50 formed in one of the side plates 47, while the other end of the shaft 48 passes through an aligned hole in the other side member 47.

Referring now more particularly to Figures 2 and 4, journaled on the shaft 48 so as to be freely  
55 rotatable thereon is an abrasive wheel 51 having ratchet teeth 52 on its periphery which is in contact with the upper end of the pyrophoric member 33. When the abrasive wheel 51 is rotated in a clockwise direction (Figure 2), portions of the pyrophoric metal 33 are torn from the body thereof and form a shower of sparks directed to the left in said figure.

As best shown in Figures 3 and 5, there are likewise freely journaled on the shaft 48 a pair of  
65 flat side arms 54, 54 forming the forward part of the finger-piece member 55. This finger-piece member 55 is shown in perspective in Figure 6 and consists of the aforesaid flat side arms 54, 54 joined together by skirt portions 56 and a back 57, the arms, the skirts and the back being desirably an integral piece. As is better shown in  
70 Figures 2 and 6, resting on the top of the skirt portions 56 and the back 57 is a finger-engaging portion 58 which may be fastened thereto by solder. As is likewise shown in Figures 2 and 6, and

on an enlarged scale in Figure 8, extending between and secured to the bottom of the skirt portions 56, 56 is a short tube 60 the purpose of which will be hereinafter explained. The front ends of the arms 54, 54 are provided with holes 63, 63  
5 through which the shaft 48 passes. Extending forwardly and downwardly from one of the flat arms 54 is a lug 66, the purpose of which will be hereinafter explained. Opposite each other in the arms 54, 54 of the finger-piece member 55  
10 are a pair of arcuate slots 67, 67 the curve of which is drawn on a radius extending from the shaft 48, and through the slots 67 extends a shaft 68 (see now Figures 2 and 3) upon which is pivotally mounted a snuffer member 70.

The snuffer member 70 is shown in perspective in Figure 7 and illustrated in its two extreme positions in Figures 2 and 3. It comprises a top portion 71 merging into a pair of downwardly  
15 extending side portions 72, 72 at one end, and side portions 73 merging into a rounded downwardly extending front portion 74 at the other end. The entire back portion of the snuffer member 70 fits within the side portions 54, 54 and the skirts 56, 56 of the finger-piece member 55, the pin 68 passing  
25 through holes in the sides 72, 72 of the snuffer member and being preferably journaled in a sleeve 75 (see Figure 5) which extends between said side portions and is suitably expanded at the ends to hold it in position, there being desirably  
30 inwardly expanded portions 75a of the side member 72 to form a wide support for the sleeve 75. Thus the snuffer member 70 is pivotally mounted on the shaft 68 which in turn is fastened to the upwardly extending side members 47 of the member 41, and the bearing for the snuffer is a wide one, reducing undesired torsional motion and friction.

Referring now to Figures 2, 3, and 7, extending into and held in position by the closed end tube 43 is a spring 76 which normally maintains the  
40 snuffer 70 in closed position wherein, by reason of the closure means which will be hereinafter described, the fuel is sealed in the fuel tank 20. In order that such closure means may be highly effective to seal the tank 20 a firm spring pressure is exerted upon the snuffer member 70 when it is in fluid sealing position and preferably by direct action of the spring 76 against the snuffer 70.

One of the chief troubles experienced with certain lighters in practice is the quick evaporation of the fuel and escape of the gas from the fuel tank. Despite the provision of a gas tight tank and a well sealed fuel opening for the introduction of liquid fuel, if the wick opening is not tightly  
55 sealed the fuel will quickly escape. It must be remembered that the fuel used is highly volatile and hence the closures should all be sealed gas tight. While some heretofore constructed lighters have been fairly effective in sealing the fuel  
60 tank, it must be remembered that individual lighters made by production methods will show variation in this respect and an improvement in the means for sealing the tank is of great practical benefit. To improve the effectiveness of the  
65 lighter in this respect I preferably provide a strong spring 76. At the same time I so arrange the parts that the spring 76 shall exert a greater force tending to close the snuffer 70 when the latter is in fluid sealing position than when it is raised. For though a spring of any desired strength could be provided there is a practical limit to the strength of the spring in lighters which snap shut owing to the fatigue experienced in holding them open and lighted, and this limit  
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has to be considered from the feminine standpoint, as there are many feminine users of these articles. But it is relatively easy to momentarily exert considerable force, so that a strong spring pressure to be overcome at the start gives practically no discomfort to the user. Furthermore there is this positive advantage in having strong spring pressure to be overcome at the commencement of the lighting operation in that a rapid revolution of the sparking wheel is thereby insured. A spring inherently operates to increase the pressure as it is compressed and thus by the provision of a spring and no more, these advantages are not obtained. I provide means associated with the spring 76 to reduce the couple exerted by it to move the snuffer 70 as the snuffer is raised or opened, and this means in part consists of the disposition of the spring 76 and associated parts.

The top portion 71 of the snuffer 70 preferably includes a portion 77 in a different and lower plane connected to the front part of the top portion 71 by a short inclined portion 78. Extending downwardly from the rear of the portion 77 is spring receiving portion 79. This portion 79 together with the side portions 72, 72 and the upper portion 77 forms a box to receive the upper end of the spring 76 which, when snuffer 70 is down or closed, as shown in Figure 2, may be nearly or quite straight, being shown in this figure as disposed in an arc of comparatively large radius with its upper end thrusting partly against the top portion 77 and partly against the portion 79. As the snuffer 70 is raised the spring 76 is bent over more and more until, when the snuffer is at or near its top position, the spring 76 is so far bent that it is no longer effective to exert a substantial compression thrust and if it does to a slight extent, nevertheless such compression thrust is exerted in line with the axis 68 of the snuffer. The reaction of the spring 76 tending to straighten it out, however, is exerted against the under side of the top portion 77 and thus the snuffer 70, if released, will close, but this is a lesser force than the resistance of the spring to compression. The transition of the spring 76 from the condition shown in Figure 2 to the condition shown in Figure 3 involves a gradual lessening of the couple exerted by the spring 76 on the snuffer member 70.

Extending rearwardly from the top portion 77 of the snuffer 70 is a portion 80 which, when the snuffer 70 is in closed position, lies under and substantially in engagement with the under side of the finger engaging portion 58 of the finger-piece 55. Preferably there is a substantial overlapping of these parts in order to keep dirt out of the well 42 and away from the mechanism of the lighter. The under side of the front of the finger portion 58 is beveled or rounded forming a bearing portion 58a which engages the portion 77 of the top plate 71 of the snuffer.

The finger-piece 55 may readily be pressed from a single piece of metal by a relatively small number of operations. Despite the single face contact between finger-piece and snuffer, there is no possibility of moving the finger-piece 55 upwardly beyond the position shown in Figure 2, because at that position the bottom of the slot 67 is substantially in engagement with the shaft 68, sufficient clearance being provided to insure tight closing of the receptacle 20.

Referring now particularly to Figures 2 and 7, a snuffer cap 81 is located at the front of the snuffer member 70 and is received within the

downwardly extending side walls 73, 73 and the rounded front portion 74. The snuffer cap 81 comprises a cylindrical member with a beveled lower lip 82 which, as clearly shown in Figure 2, is adapted to seat against a mating beveled seat 83 provided on a wick tube 84 extending through the top wall flange 40 and the member 41 into the inside of the receptacle 20. The upper part of the wick 87 is normally received inside of the snuffer cap 81 as shown in Figure 2, while the bottom thereof extends into the tank 20 which is desirably filled with cotton wool, not shown. When the finger-piece 55 is depressed, not only is the snuffer cap 81 raised by reason of the rotation of the snuffer 70 described, but also sparks are directed against the wick 87 by rotation of the abrasive wheel 51 on the pyrophoric metal 33. This action ignites the wick 87 which provides a flame that may be extinguished at any time by return of the snuffer member 81 to the position 20 shown in Figure 2. It should be noted that the snuffer cap 81 is carried well out of the way of the flame when the lighter is lit, as clearly shown in Figure 3. When the snuffer cap 81 is in the position shown in Figure 2 the tank 20 is effectively sealed against escape of liquid fuel, as the cap 81 is urged firmly against the wick tube 84, by reason of the direct and strong pressure of the spring 76, and in this connection it is noted that the limit to counter clockwise movement of the snuffer 70 is set by the engagement of the snuffer cap 81 with the seat 83 in order to seal the fuel in the tank 20 by the strong spring pressure as described.

Referring now particularly to Figures 2, 3, and 35 7, extending between the side members 73, 73 of the snuffer member 70 is a pin 88 upon which pin is mounted a spring 89 one end of which presses against the bottom of the top piece 71 of the snuffer member 70 and the other end of 40 which is looped around portion of an arcuate pawl arm 90. This pawl arm is pivotally mounted upon the pin 88 and has many teeth 91 which are located on the inside of the curve in engagement with a ratchet wheel 92 that is rigidly fastened 45 to the abrasive wheel 51 on one side thereof, as clearly shown in Figure 5. The teeth 93 of the ratchet wheel, as best shown in Figure 2, face in a direction opposite to that of the teeth 52 of the abrasive wheel 51, while the teeth 91 of the 50 pawl arm face in the direction adapted to cause rotation of said ratchet wheel when the pawl arm 90 is moved upwardly. When, however, the pawl arm 90 is moving downwardly in response to a closing movement of the snuffer 70, the teeth 55 91 and 93 readily slide over each other.

Referring particularly to Figure 4, there is desirably provided a washer 94 between one arm 54 and the abrasive wheel 51 to reduce friction of the parts and to eliminate side play so as to maintain the teeth 91 and 93 in engagement. The pawl arm 90 is guided laterally upon one side by the edge of the platform 45, as clearly shown in Figure 5, and is prevented from moving forwardly beyond a distance sufficient to clear the teeth 65 93 when moving downwardly by one edge 96 of the top wall flange portion 40. At the other side the pawl arm 90 is guided by the lug 66 on the front of one of the arms 54. It should be observed that not only is the snuffer member 70 moved through a relatively wide arc when the finger portion 58 is moved from top to bottom, but that the size of the pawl arm 90 in relation to the diameter of the ratchet wheel 92 is such that depression of the finger portion 58 results in a con- 75

siderable angular movement of the abrasive wheel 51 by reason of which a high velocity may be imparted to it.

As already indicated, the device is normally in the position shown in Figure 2, in which position the fuel tank 20 is sealed by the snuffer cap 81 against escape not only of liquid but also of gaseous fluid. The device may be operated to light the wick 87 while held in one hand by holding the body portion of the receptacle 20 with the fingers and engaging the finger-piece 55 with the thumb, or in any other desired manner. The finger-piece 55, when depressed, causes elevation of the snuffer 81 and rotation of the sparking wheel 51 and it will be observed that the finger-piece 55 exerts a leverage upon the snuffer to move it at a greater angular velocity and this leverage increases as the finger-piece 55 is moved downwardly. The parts 55 and 70, as shown in Figure 2, are at one limit of their extreme travel in one direction, and the finger-piece 55 is shown in its extreme depressed position in Figure 3. Ordinarily when it is desired to light a cigarette, however, the finger-piece 55 will not be depressed as far as it is shown depressed in Figure 3, but will be brought only to that position in which the bottom of the tube 60 which, as heretofore noted, is attached to the bottom of the finger-piece 55, engages a flat spring 97 secured to the bottom of the well 42. This flat spring 97, under usual conditions of use, constitutes a limiting stop to arrest the movement of the finger-piece 55, sufficient elevation of the snuffer cap 81 and sufficient rotation of the abrasive wheel 51 being secured by the time the tube 60 engages the spring 97 to light the wick 87 and provide sufficient clearance for the flame. The spring 97 is preferably a stiff spring which is not easily compressed.

In the use of lighters, it is frequently desirable to leave them lighted or to pass them around for the purpose of lighting a number of cigarettes without repeated actuation of the mechanism. The ordinary so-called "single motion" lighter, in which the snuffer is automatically returned to cover the wick and extinguish the flame whenever the finger is lifted from the finger-piece, could not be used in this way. By my invention I provide a so-called "single motion" lighter which may be manipulated to lock the snuffer in open position so that the lighter may be passed around as specified. Preferably a conscious effort or motion is involved in order to thus lock the snuffer member in raised position. Preferably also the snuffer is easily released as by a simple actuation of the finger-piece or the snuffer itself.

Referring now to Figures 2, 3, and 8, the tube 60 contains a detent pin 98 which, as shown in Figure 8, may move partly out of the tube 60 on one side thereof, but not on the other side, one end of the tube 60 being swedged over, as shown at 99. Referring more particularly to Figures 2 and 8, the side wall of the member 41 forming the well 42 is pressed inwardly to form a detent 100 having a substantially horizontal shoulder 101 on the bottom and a beveled portion 102 on the upper part thereof. When and if the finger-piece 55 is depressed to the position shown in Figure 3 against the action of the strong flat spring 97, compressing the latter to the condition shown in Figures 3 and 8, the pin 98 may slide beneath the shoulder 101, and will so slide if the lighter is held slightly inclined so that the pin 98 has a tendency to travel toward that side of the well 42 having the detent 100. If now the finger-piece 55 is released, it will not

rise, for the pin 98 will engage the shoulder 101 owing to the action of the spring 76 and friction will prevent the pin 98 from reentering the tube 60 so long as the finger-piece 55 is not depressed. To extinguish the lighter, after it has been latched in open position, and to cause the snuffer 81 to be replaced upon the wick tube 84, the finger-piece is depressed to relieve the pressure between the pin 98 and the shoulder 101, and the lighter slightly inclined so that the pin 98 has a tendency to travel back into the tube 60, which it will then do. The lighter will then snap shut upon release of the finger-piece. The lighter thus operates normally to light the wick upon movement of the finger-piece and extinguish the same upon release of the finger-piece, but may be locked in lighted condition by two acts, neither of which is apt to be unconsciously performed, and both of which together are nevertheless very easily performed.

The lighter described makes a distinct clicking sound when the snuffer closes owing to the jumping of the teeth 91 over the teeth 93. This is a pleasing sound in contradistinction to the somewhat grating sound which all lighters emit during the lighting operation. To partially obscure this grating sound during the lighting action, I may provide means for causing the lighter to emit a slight clicking sound as the snuffer 70 is raised. Referring now to Figures 2 and 3, to the inside of the back portion 57 of the finger piece 55 is fastened a notched member 105 made out of flat metal so as to be resilient. This notched member 105 is engaged by the end of the rearwardly projecting portion 80 which is preferably sharpened so as to have a tendency to seat in the several notches 106, 106 of the notched member 105. Owing to the fact that the snuffer 70 and the finger-piece 55 are mounted on different axes and on account of the movement along the portion 77 of the bearing portion 58a as the lighter is operated, there is a relative motion between the rearwardly projection portion 80 and the notched member 105 so that the aforesaid clicking sound is omitted when the lighter is lighted. Furthermore, engagement of the portion 80 with the notched resilient member 105 causes momentary resistance to the lighting operation, particularly at the commencement thereof, which still further insures the exertion of a strong finger pressure to cause rapid revolution of the sparking wheel 52.

Referring now to Figures 1, 2 and 3, attached to the top portion 77 of the snuffer 70 by means of a rivet 108 is a ring 109. The ring 109 is a swivel ring, the rivet 108 being loose enough to allow it to turn easily thereon as an axis. Thereby the lighter may be attached to a watch chain, and when so attached will have a tendency to stand upright in the pocket of a user. It will be noted that, as shown in the figures referred to, the side walls of the receptacle 20 bulge outwardly. A lighter having a receptacle so shaped has little tendency to lie over in the pocket of a user, and when attached to a watch chain by means of the ring 109 will have a strong tendency to remain upright. It has been found in practice that lighters lose their fuel much more rapidly when the axis of the wick tube 84 is horizontal or nearly horizontal than when it is vertical, probably owing to the fact that when the wick tube 84 is nearly horizontal, liquid actually gets into the inside of the snuffer cap 81 and escapes by osmotic pressure. It will be noted that the pull of the chain on the ring 109, which is located over the shaft 68, has no tendency to open the snuffer.

and that the center of gravity of the lighter is substantially directly below the ring 109 when the lighter is upright, as shown in Figure 2.

Referring now to Figures 9, 10, and 11, there is therein illustrated a different embodiment of the means for locking the lighter in lighted position. The various parts of the mechanism of Figures 9, 10, and 11 may be and preferably are the same as already described in connection with the embodiment of Figures 1 to 8 inclusive, with the exception of certain features now to be pointed out. Referring now to Figure 11, the pawl arm 90a is preferably somewhat thicker than the pawl arm of the other embodiment, or other suitable expedient is adopted to provide it with a shoulder 110. This shoulder 110 is slightly inclined to a radius line of the arc of curvature of the pawl arm, or somewhat inclined to the radius line of the locus of movement thereof as the snuffer moves to snuffing position. Referring now to Figures 9 and 10, the finger-piece 55 has a forwardly projecting portion 66a of a shape slightly different from the portion 66 already described; this forwardly projecting portion 66a has the function already described in connection with the portion 66 and also constitutes a latch for cooperation with the shoulder detent 110.

When the snuffer is raised and the spring 97 compressed, the shoulder 110 passes by the projecting portion 66a, and upon release of the finger-piece the shoulder 110 comes into engagement with the projecting portion 66a which acts as a detent to hold the pawl arm 90a. The pawl arm 90a is resiliently urged to bring the shoulder 110 and the projecting portion 66a into engagement by the spring 89 on account of the location of the spring 89 on the shaft 88.

Referring now to Figure 9, it will be noted that the projecting portion 66a is shaped to receive the portion 110 in substantially parallel relation therewith. The shoulder 110 urges downwardly the portion 66a, tending to cause the finger-piece 55 to rise, and, assuming that the notched member 105 is omitted from the modification of Figure 9, the finger-piece 55 will rise to the position shown in that figure without, however, a substantial lowering of the snuffer 70 owing to the short distance between the face of the projecting portion 66a and the axis thereof which passes through the holes 63. Further upward movement of the finger-piece 55 is positively prevented by the engagement of the wall of the slot 67 with the shaft 68, and consequently the parts remain in the position shown in Figure 9, or if the notched member 105 be used in this embodiment of the invention, the parts are held with the finger-piece in its lowermost position. The couple exerted by the spring 89 on the pawl arm 90a holds the shoulder detent 110 against the projecting detent 66a despite the slight pitch of these detents with respect to the path of movement of the pawl arm 90a and the pressure of the spring 76, but the snuffer 55 may be forced down, in which case the incline of the detents 66a—110 projects the pawl arm 90a forwardly, thus releasing it and allowing the parts to snap back to original position. It should be noted that in case the notched member 105 is used with the embodiment of Figure 9, such action may be occasioned by positive forcing upward of the finger-piece 55 with the finger, and if such notched member 105 be omitted, the closing action may be initiated by directly pushing the snuffer 70 with the finger. In order to allow the pawl arm 90a to pass by its

locking position as just described, the slot in which it fits is longer than in the case of the modification of Figures 1 to 8, and the shoulder 96a more removed from the axis of the shaft 48.

In this modification of the invention it will be seen that normally the snuffer will automatically close when the finger-piece is released, provided the strong flat spring 97 is employed and that the lighter may be operated either to lock it open or to cause it to automatically close, irrespective of its angular position as a whole. If desired, the flat spring 97 may be omitted, in which case control of the lighter, especially when the notched member 105 is included, is effected by manipulation of the finger-piece, a very slight upward movement thereof serving to shut the lighter.

According to both modifications of the invention, the parts may be easily and quickly assembled owing to the wide space in the finger-piece for the reception of the snuffer and the ease with which the spring 76 may be mounted in position. The whole mechanism is secured in place by the two screw shafts 48 and 68.

It will thus be seen that there have been provided by this invention an article and apparatus in which the various objects hereinabove set forth, together with many thoroughly practical advantages, are successfully achieved.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a lighter, an elongated top wall, a wick near one end thereof, a snuffer member journaled above said wall about an axis parallel thereto and mounted for cooperation with said wick, a portion of said snuffer member extending a substantial distance to the other side of its axis from said wick, a push spring in direct engagement with said portion and acting against the under side thereof, a pin, and a finger piece having a tubular portion from which said pin extends when said finger piece is moved downwardly said pin being adapted to maintain said finger piece in its downward position.

2. In a lighter, the combination with a fuel receptacle, a wick projecting from said receptacle, an abrasive wheel adjacent said wick and pyrophoric material in contact with said wheel, of a snuffer for said wick, resilient means urging said snuffer into snuffing position, a pair of detents to hold said snuffer in open position against the action of said resilient means, and a strong spring positioned to oppose the raising of said snuffer and making it difficult to engage said detents with each other.

3. In a lighter, a burner, a snuffer for said burner, a spring urging said snuffer into snuffing position, means operated when said snuffer is opened to light said burner, a latch to hold said snuffer against the action of said spring adapted to act on said snuffer in nearly one extreme position thereof and additional spring means coming into action to resist opening of said snuffer just before it reaches said position.

4. In a lighter, the combination with a fuel receptacle, a wick projecting therefrom, a sparking wheel mounted on top of said receptacle, a snuffer for said wick, a movable snuffer arm member for said snuffer pivotally mounted on top of



said receptacle, and a movable finger piece member mounted for downward movement on said receptacle, of means connecting said finger piece and said snuffer, means connecting said finger piece and said sparking wheel whereby downward movement of said finger piece elevates said snuffer and rotates said sparking wheel, a spring, and a mounting for said spring in said receptacle and another mounting for said spring on one of said movable members biased with respect to said first named mounting to decrease the effective couple on said movable snuffer arm member as said snuffer is elevated.

5. In a lighter, a receptacle, a wick projecting from said receptacle, a pyrophoric member, an abrasive wheel engaging said pyrophoric member, a snuffer for said wick, a ratchet wheel connected to said abrasive wheel, a ratchet rack carried by said snuffer in engagement with said ratchet wheel, and latch means on said ratchet rack to hold said snuffer in raised position.

6. In a lighter, the combination with a fuel receptacle, a wick projecting therefrom, a sparking wheel mounted on top of said receptacle, a snuffer for said wick, a movable snuffer arm member for said snuffer pivotally mounted on top of said receptacle, and a movable finger piece member mounted for downward movement on said receptacle, of means connecting said finger piece and said snuffer, means connecting said finger piece and said sparking wheel whereby downward movement of said finger piece elevates said snuffer and rotates said sparking wheel and, a spring urging said snuffer arm member to cause said snuffer to enclose said wick, said spring with the pivot for said movable snuffer arm member exerting a couple on said snuffer arm member, said spring being disposed with relation to said pivot and said snuffer arm member to cause said couple to diminish as said snuffer is raised.

7. In a lighter, the combination with a fuel receptacle, a wick projecting therefrom, a sparking wheel mounted on top of said receptacle, a snuffer for said wick, a movable snuffer arm member for said snuffer pivotally mounted on top of said receptacle, and a movable finger piece member mounted for downward movement on said receptacle, of means connecting said finger piece and said snuffer, means connecting said finger piece and said sparking wheel whereby downward movement of said finger piece elevates said snuffer and rotates said sparking wheel, a coiled spring extending between said receptacle and one of the movable parts and mountings for said spring whereby it is doubled over into U-shape when said snuffer is raised thus to reduce its force when the finger piece is depressed and the snuffer is raised.

8. In a lighter, the combination with a fuel receptacle, a wick projecting from said receptacle, an abrasive wheel adjacent said wick and pyrophoric material in contact with said wheel, of a snuffer for said wick, resilient means urging said snuffer into snuffing position, a pair of detents located so as to interengage to hold said snuffer in open position, one of said detents being responsive to the position in which the lighter is held to determine whether it shall engage the other detent, and additional spring resilient means positioned to oppose the raising of said snuffer just prior to the time when said detents come opposite each other to make it difficult to engage said detents.

9. In a lighter, the combination of a fuel receptacle, a wick projecting therefrom, a wick tube

surrounding said wick, a snuffer cap having a seat for cooperation with a seat on said wick tube to seal said receptacle, a snuffer member, spring means urging said snuffer into the position in which said cap seals said receptacle, means mounting said spring means on said snuffer member, and means mounting said spring means in said receptacle, said last two means being so disposed relative to each other that the effective force of said spring means to close said snuffer cap diminishes as said snuffer is raised.

10. In a lighter, the combination with a fuel receptacle, a wick projecting from said receptacle, an abrasive wheel adjacent said wick, and pyrophoric material in contact with said wheel, of a snuffer for said wick, resilient means urging said snuffer into snuffing position, a stationary detent, a movable detent, means movably mounting said movable detent to guide it into a position to engage said stationary detent to maintain the snuffer in wick-uncovering position against the pressure of said resilient means, said movable detent being of such mass that it moves relative to its mounting means in response to tilting of the lighter, said detents being so formed as to allow release of the snuffer upon removing the pressure of said resilient means and tilting the lighter.

11. In a lighter, a receptacle, a wick projecting from said receptacle, a pyrophoric member, a finger piece, connections between said abrasive wheel and said finger piece whereby movement of said finger piece causes rotation of said abrasive wheel to throw sparks on said wick, a spring constantly urging said finger piece towards its original position, a detent to latch said finger piece against the action of said spring when said finger piece is depressed to a given position, means opposing movement of said finger piece to said given position additionally to said spring, said means being inoperative during the major portion of the downward movement of said finger piece, and a snuffer operated by said finger piece.

12. In a lighter, a burner, a snuffer for said burner, a spring urging said snuffer into snuffing position, means operated when said snuffer is open to light said burner, a latch to hold said snuffer open against the action of said spring, said latch automatically acting when said snuffer is moved to a certain position, resisting means interposed in the path of movement of said snuffer, and means making it difficult to move said snuffer to said position, said resisting means becoming effective when said snuffer nears said position.

13. In a lighter, the combination with a burner, a holder for pyrophoric material, an abrasive wheel adjacent said holder, a finger piece member to operate said abrasive wheel, and a separate snuffer member for said burner of resilient means operating against one of said members to return said snuffer member to said snuffing position, latch means to hold one of said members inoperative when said one member has reached a certain position, said latch means being releasable by manual pressure on one of said members, and restricting means opposing movement of said one member to said certain position, and operative as said one member nears said position.

14. In lighter construction, in combination, a receptacle dimensioned to lie within the hand, a burner mounted in said receptacle and extending from the top thereof, a holder for pyrophoric

material secured in said receptacle substantially adjacent said burner, an abrasive wheel rotatably mounted upon the top of said receptacle adjacent said holder, a finger piece member pivotally mounted on the top of said receptacle for operating said abrasive wheel, said receptacle including a well portion in the top thereof into which said finger piece pivots, a snuffer member for said burner pivotally mounted on the top of said receptacle and operatively connected to said finger piece member, resilient means operating against one of said members to return said snuffer member to snuffing position, said finger piece being so positioned on the top of said receptacle as to render it readily operable by the thumb when said receptacle is grasped in the hand, a projection extending inwardly from one wall of said well portion, and detent means on said finger piece adapted to engage said projection when said finger piece is pivoted into said well portion whereby said snuffer member is maintained out of snuffing position, said detent means being engageable and disengageable with said projection by tilting said receptacle.

15. In lighter construction, in combination, a receptacle dimensioned to lie within the hand, a burner mounted in said receptacle and extending from the top thereof, a holder for pyrophoric material secured in said receptacle substantially adjacent said burner, an abrasive wheel rotatably mounted upon the top of said receptacle adjacent said holder, a finger piece member pivotally mounted on the top of said receptacle for operating said abrasive wheel, said receptacle including a well portion in the top thereof into which said finger piece pivots, a snuffer member for said burner pivotally mounted on the top of said receptacle and operatively connected to said finger piece member, resilient means operating against one of said members to return said snuffer member to snuffing position, said finger piece being so positioned on the top of said receptacle as to render it readily operable by the thumb when said receptacle is grasped in the hand, a projection extending inwardly from one wall of said well portion, detent means on said finger piece adapted to engage said projection when said finger piece is pivoted into said well portion whereby said snuffer member is maintained out of snuffing position, said detent means being engageable and disengageable with said projection by tilting said receptacle, and spring means disposed in the bottom of said well portion for resisting the engagement of said detent means with said projection.

16. In lighter construction, in combination, a receptacle dimensioned to lie within the hand, a burner mounted in said receptacle and extending from the top thereof, a holder for pyrophoric material secured in said receptacle substantially adjacent said burner, an abrasive wheel rotatably mounted upon the top of said

receptacle adjacent said holder, a finger piece member pivotally mounted on the top of said receptacle for operating said abrasive wheel, said receptacle including a well portion in the top thereof into which said finger piece pivots, a snuffer member for said burner pivotally mounted on the top of said receptacle and operatively connected to said finger piece member, resilient means operating against one of said members to return said snuffer member to snuffing position, said finger piece being so positioned on the top of said receptacle as to render it readily operable by the thumb when said receptacle is grasped in the hand, and latch means to hold one of said members, said latch means being releasable by one of said members.

17. In lighter construction, in combination, a receptacle dimensioned to lie within the hand, a burner mounted in said receptacle and projecting from the top thereof, a holder for pyrophoric material mounted in said receptacle and projecting through the top thereof adjacent said burner, an abrasive wheel rotatably mounted on the top of said receptacle and operatively associated with the pyrophoric material in said holder, a finger piece member pivotally mounted on the top of said receptacle for operating said abrasive wheel, a snuffer for said burner mounted on the top of said receptacle and operatively connected to said finger piece member, resilient means disposed within said receptacle and positioned to resist the pivoting of one of said members, said means being adapted to return said snuffer member to snuffing position, and latch means for holding one of said members in its pivoted position whereby said snuffer member is maintained in spaced relationship to said burner, said latch means being releasable by moving one of said members, said finger piece member being so related to the top of said receptacle that it may be operated by the thumb when said receptacle is grasped in the hand.

18. In lighter construction, in combination, a fuel receptacle, a wick disposed within said receptacle and extending exteriorly thereof, a holder for pyrophoric material secured in said receptacle substantially adjacent said wick, an abrasive wheel operatively related to said pyrophoric material, a snuffer for said wick, a finger piece operatively connected to said snuffer, means responsive to actuation of said finger piece for moving said snuffer into wick-uncovering position and for rotating said wheel to throw sparks onto said wick, means resisting movement of said finger piece and offering a substantially greater resistance to movement during a later range of movement than during an earlier range of movement of said finger piece, and latch means rendered optionally operable only during said later range of movement of said finger piece for holding said snuffer in wick-uncovering position.

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