

March 7, 1933.

H. S. STRAUSSER ET AL

1,900,207

POCKET LIGHTER

Filed Nov. 27, 1929

2 Sheets-Sheet 1

Fig. 1

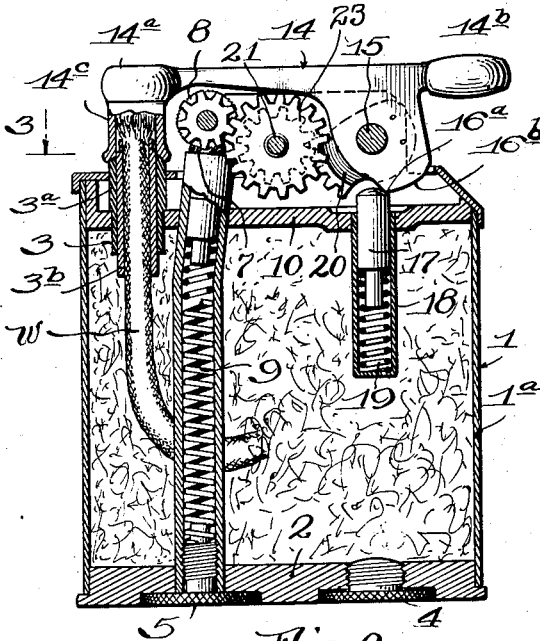
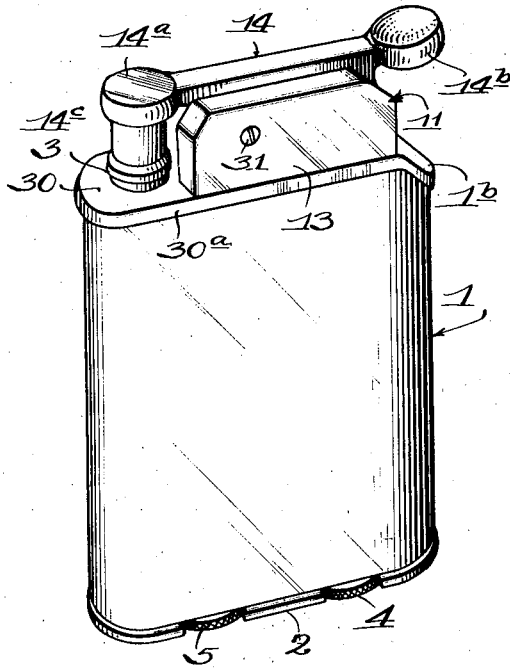
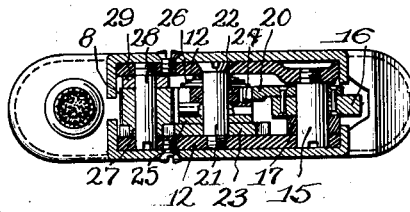


Fig. 2

Fig. 3



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2 Sheets-Sheet 2

Fig. 4

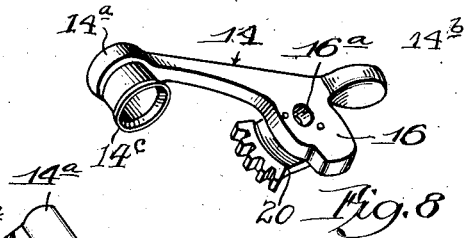
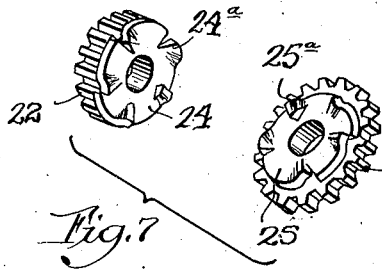
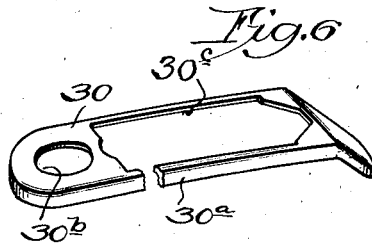
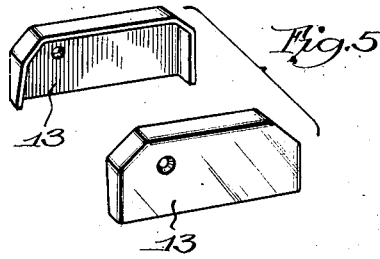
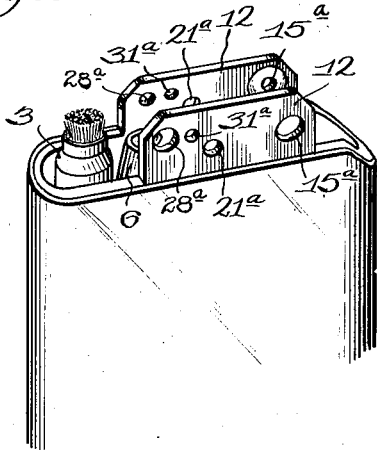
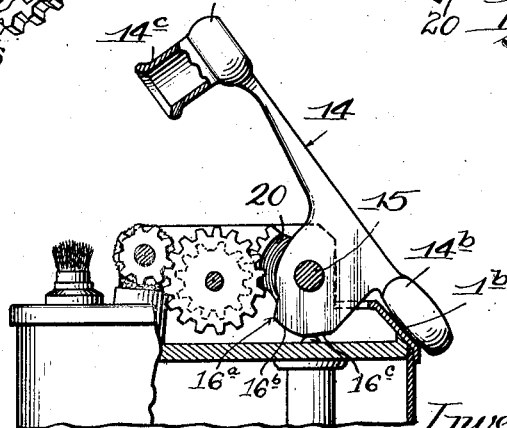


Fig. 9



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# UNITED STATES PATENT OFFICE

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## POCKET LIGHTER

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This invention relates to improvements in pocket lighters, and more particularly to novel and improved igniting mechanism for portable lighting devices having a wick end adapted to be ignited by sparks generated by a friction wheel rotated in contact with a pyrophoric element.

The object of the invention is to provide an ignition mechanism operative by the downward pressure of thumb or finger upon one end of an operating lever comprising also the snuffer bar, the movement or action being characterized by greater ease of manipulation and certainty of ignition.

A further object of the invention is to provide a manually operated bar or lever connected with the friction wheel through an intermediate arrangement of gearing including a clutch, whereby the rotation imparted to the friction wheel is proportionally greater than the arc transversed by the operating lever, thereby insuring increased frictional contact with the pyrophoric element and a corresponding increased volume of spark, the clutch functioning in the meantime to effect the rotation of the friction wheel in but one direction.

A preferred embodiment of our invention is disclosed in the accompanying drawings, in which

Figure 1 is a perspective view of the improved lighter;

Figure 2 is a view in vertical section through the lighter;

Figure 3 is a view in cross-section taken on line 3—3 of Figure 2;

Figure 4 is a perspective view of the top portion of the lighter stripped of all removable parts including the ignition mechanism;

Figure 5 is a perspective view of the side plates completing the housing for the ignition mechanism;

Figure 6 is a perspective view of the top cover plate removed;

Figure 7 is a perspective view of the two intermediate gear members with coaxing clutch plates;

Figure 8 is a perspective view of the snuffer bar; and

Figure 9 is a view in side elevation of the

upper part of the lighter showing portions in section and the snuffer bar in open position.

The lighter herein disclosed is of the type having a thin rectangular shaped casing 1 of a convenient size to fit the pocket, and the lighting mechanism assembled at one end, although the fuel casing may be of other shapes, as for instance, in desk or table lighters. The casing contains the usual filling of cotton and wick W, the latter having one end projecting from a wick standard 3 mounted at one end of the casing.

The casing 1 is made up of several parts, as follows: A flat shell 1a of thin metal open at both ends forms the body of the casing. A somewhat thicker bottom plate 2 is fitted and soldered into the lower end of said shell. In the bottom plate 2 are openings normally closed by screw plugs 4 and 5 having flat discs with milled edges, which seat flush in shallow recesses in said bottom plate. One of these openings is closed by the plug 4 communicating with the interior of the casing and serves for filling the same with fuel. The opening closed by plug 5 is the lower end of a tube 6 extending lengthwise of the casing and containing the pyrophoric element 7 bearing endwise against the friction wheel 8, presently to be described, and backed by a coil spring 9 bearing at its lower end against the closure plug 5.

Into the upper end of the shell 1a is fitted a plate 10 seating a short distance below the edge of the shell and thus forming a shallow recess or cavity extending across the top end of the casing. At one end of the plate 10 is mounted the wick standard 3, already mentioned, the same comprising a tube 3a projecting a short distance above the plate and retaining a smaller and endwise adjustable tube 3b through which the end of the wick W passes, as shown in Figure 2. Just inwardly from the wick standard 3 is the upper end of the tube 6 which also passes through the plate 10 and terminates above the same at about the level of the wick standard.

Extending above and transversely across the upper end of the fuel casing is a rectangular housing 11, consisting primarily of two upstanding webs 12, 12 integral with upper

end plate 10, and extending in parallel relation along the side edges of the casing. In the space between these webs are mounted the several rotating parts of the ignition mechanism, the webs forming a supporting frame for the pivot pins on which these parts are journalled including the friction wheel 8 adjacent the wick standard. By preference, a pair of flanged side plates 13, 13 are mounted exterior the webs 12, 12, concealing the moving parts and giving the lighter a more finished appearance.

Extending across the top of the housing 11 is the snuffer bar 14, having flat heads at either end projecting beyond the ends of the housing. The head 14a at the end adjacent the wick standard has a depending sleeve 14c open at its lower end and forming a cap seating over the wick end and around the base of the wick standard when said snuffer bar is in closed position. The head 14b at the opposite end of the bar is the operating lever or button which is pressed down by the thumb or finger to actuate the igniting mechanism and simultaneously uncover the wick end.

The snuffer bar 14 is pivotally mounted between the webs 12, 12, being journalled on a pivot pin 15 supported at its ends in holes 15a, 15a drilled in said webs near their ends remote from the wick standard (Figure 4). Forming the fulcrum of the snuffer bar is a lateral extension or arm 16, projecting downwardly into the cavity at the top of the casing just forwardly of the operating lever button 14b, said arm 16 having a centrally located hole 16a through which the pivot pin 15 extends (Figure 8).

Mounted directly below the pivotal axis of the snuffer bar is a spring plunger 17, held within a tubular well 18 secured in the top wall 10 of the lighter casing and backed by a coil spring 19, forcing the same upwardly and into contact with the lower edge of the arm 16 on a line passing through the fulcrum of the snuffer bar. The portion of the edge of the arm having sliding contact with the tip of the plunger forms a cam designed to direct the pressure of the plunger on the snuffer bar in such a way as to influence the action of the same, as will presently be described in greater detail.

Also forming an integral part of the snuffer bar 14 is a gear sector 20 consisting of a flat plate-like member riveted to one face of the arm 16, with its toothed edge or gear segment extending beyond the edge of the arm in the general direction of the free end of the snuffer bar, and having operative connection with a train of gear wheels interposed between the snuffer bar and the friction wheel.

Referring now to this intermediate gearing, the same comprises parts as follows: A pivot pin 21 is supported at its ends in holes

21a, 21a in the webs 12, 12 (Figure 4), and on the bearing portion thereof are journalled two gear wheels 22 and 23. The smaller gear wheel 22, which may be also designated as the driven gear, lies in the plane of, and meshes with the gear sector 20 of the snuffer bar. The larger or driving gear wheel 23 lies in the plane of a gear wheel integral with the friction wheel 8, presently to be identified, and with which it meshes. By this arrangement also, the smaller or driven gear wheel 22 is capable of sliding on the pin 21 toward and from the driving gear wheel 23.

Between the two gear members is a clutch consisting of two discs 24 and 25 having complementary sets of clutch teeth 24a and 25a facing in opposite directions, each of the discs being integrally connected, as by welding, to the opposing faces of the gear wheels 22 and 23 respectively. Between the driven gear 22 and the adjacent web 12 is a space occupied by the helical spring 26 which surrounds the bearing pin 21 and acts to exert a lateral pressure on said driven gear, tending to force the clutch discs together into contact with each other. The clutch teeth 24a and 25a (Figure 7) are preferably formed by cutting radial slits in the periphery of each disc and upsetting the portion on one side of each slit to form circumferentially facing teeth. Thus, the clutch teeth facing in the opposite directions cause the two gear wheels to rotate together when the driven gear 22 is rotated in one direction, namely, counter-clockwise (Figure 2) along the gear sector 16 as the snuffer bar rotates in a clockwise direction on its fulcrum in the act of igniting the lighter. On the other hand, when the driven gear 22 is rotated in the opposite (clockwise) direction, the clutch teeth merely ride over each other and the driving gear 23 is not turned, this action occurring when the snuffer bar is closed. It will be noted that the clutching action is accompanied by a slight shifting of the driven gear 22 to and from the driving gear 23, the shifting movement being added in one direction and opposed in the other by the pressure of the spring 26. It has been found, however, that only a very slight pressure is necessary to insure a positive action, in fact, it has been satisfactorily demonstrated that the spring 26 may be omitted entirely without having any apparent effect on the action.

The driving gear 23 which, as has been noted, is of slightly greater diameter than the driven gear 22, meshes with a pinion 27 integral with and located on one side of the friction wheel 8, the two turning loosely on a bearing pin 28, supported at its ends in holes 28a, 28a in the webs 12, 12. As before stated, the friction wheel 8 is positioned just rearwardly of the wick standard and above the end of the tube 6 with the pyrophoric element 7 bearing against its periphery. A

spacing collar 29 is mounted on the pin 28 on the side of the friction wheel opposite said pinion 27, thus preventing endwise shifting of the friction wheel unit.

5 As will be seen by comparing the positions of the snuffer bar in Figures 2 and 9, its movement or throw is confined to an arc of approximately 60°, its upward movement being limited by the contact between the head 10 14b and a bevelled or inclined face 13 at the adjacent end of the top of the lighter casing. Thus, on pressing down upon the operating end of the snuffer bar, the lifting of the same is accompanied by the rotation of the friction 15 wheel by the power transmitted from the gear sector 16 through the gear and clutch assembly on the intermediate shaft 21, and finally to the gear 27 carried by friction wheel 8.

20 These gear wheels thus form a gear train of increasing ratio, with the result that the angular displacement of the friction wheel is considerably greater than that of the snuffer bar. In other words, assuming that the 25 snuffer bar is swung through an angle of 60° when pressed to operate the igniting mechanism, the friction wheel is simultaneously rotated through a considerably greater arc and at a somewhat increased speed. In this manner a more positive ignition is insured since 30 a greater part of the circumference of the wheel passes over the pyrophoric element with a resulting greater volume of sparks being projected toward the wick end.

35 The manifest purpose of the clutch is to interrupt the drive from the snuffer bar to the friction wheel while the former is being closed, and for two reasons, first, to prevent unnecessary wear of the pyrophoric element, 40 and second, to remove the resistance of the friction wheel to the closing of the snuffer bar.

The movement of the snuffer bar from closed to open position (in the act of igniting the wick) and from open to closed position (in the act of extinguishing the flame) 45 passes through three separate stages. Referring to Figure 2 in which the snuffer bar is in closed position, it will be noted that the end of the spring plunger 17 bears on the cam plate just to the left of a point 16a 50 formed by two sectors of the edge of the extension or cam plate 16 meeting substantially at right angles, and located just to the right of the vertical line passing through the fulcrum point or center of the pin 15. Thus the pressure of the spring plunger is exerted 55 in a direction to hold the cap end of the snuffer bar to its seat over the wick end. Now, it also follows that this pressure also resists the finger pressure exerted at the operating end of the bar to open the same, this resistance being maintained until the finger pressure overcomes the counter spring pressure, 60 and the latter suddenly releases the tip 16a

of the cam, and the bar quickly opens to its elevated position shown in Figure 9 as the top of the plunger slides over a short curved cam face 16b to the right of the point 16a, 70 said cam face 16b being slightly eccentric to the axis of the pivot pin 14, that is to say the radius increases slightly as the snuffer bar approaches its raised position, with an accompanying increase in the pressure exerted by the spring plunger. The cam face 75 16b terminates at its right end (Figure 9) in a flat face 16c against which the end of the plunger 17 bears when the snuffer bar reaches its fully raised position, it being noted that the point of contact of the plunger 80 with the flat face 16c being practically in vertical alignment with the center of the pivot pin 15, with the result that the snuffer bar will remain in raised position without the pressure of the finger to hold it. And finally, 85 to close the snuffer bar it is only necessary to shift the bar until the plunger clears the flat face 16c, whereupon the spring action becomes effective to snap the bar to closed position with a quick motion. Thus it will 90 be seen that the bar is actuated to ignite the wick by finger pressure momentarily resisted by the spring plunger to insure a rapid and dependable igniting stroke; that the bar remains in open position so that the lighter can be passed from one person to another, and finally the bar is snapped closed by the spring plunger by merely tripping it from its raised position.

Prior to the assembly and mounting of the 100 parts of the ignition mechanism, the lighter has the appearance shown in Figure 4, with the two webs 12, 12 drilled to receive the three bearing pins supporting the several 105 parts of the igniting mechanism. To complete the assembly of the lighter after the ignition mechanism has been mounted in place, a thin false plate or cover 30 (Figure 6) is fitted over the top of the casing and covers the exposed portion of the cavity. 110 This plate 6 conforms exactly to the top of the casing and has a short marginal flange 30a entirely around its edge, so that when the plate is seated the marginal flange extends over the edges and forms a beading, as clearly 115 shown in Figure 1. Portions of the plate are cut away to provide a circular opening 30b at one end for wick standard 3, and a larger elongated opening 30c shaped to fit around the webs 12, 12, while the end of the plate beyond the opening 30c is beveled and rounded to fit over the beveled top edges of the casing just below the head 14b of the snuffer bar. The plate 30 is stamped from thin sheet metal, and in the stamping process the plate is given a slight upward bow or convexity from end to end, which is apparent in Figure 6. The reason for this will be 120 presently explained.

Having applied the plate 30 over the top 125 130

end of the casing, the last operation of assembly is to attach the left and right side plates 13, 13 to the webs 12, 12 (Figure 5). These side plates conform generally to the shape of the webs, but are flanged along their top and end edges so that when placed flatwise against their respective webs, the flanges extend inwardly toward each other, leaving only a slot between for the snuffer bar and an opening at the front to permit the sparks from the pyrophoric element to reach the wick. In applying the side plates, their lower edges abut against the marginal portions of the cover plate 30 and are securely fastened to the webs by screws 31, 31, which are anchored in small tapped holes 31a drilled in said webs (Figure 4). Due to the slight upward bowing of the plate 30, it follows that in order to bring the screw holes in the side plates and webs into register, the latter must be forced downwardly with sufficient force to straighten or flatten out the cover plate 30, with the result that when the side plates are once fastened in place the resiliency of the plate 30, tending to resume its normal convexity, exerts an upward force against the side plates sufficient to hold the screws tightly in place, thus preventing them from working loose and eventually dropping out. Figure 1 presents the lighter in its completed form and accentuates the trim and workman-like appearance characterized by the marked absence from view of the moving parts of the igniting mechanism which, with the exception of the snuffer bar, are completely enclosed and therefore hidden within the small housing at the upper end of the casing. Being thus hidden, these parts are necessarily protected against accumulations of dirt and dust, insuring long and dependable service.

Considered as a mechanical structure, the ignition mechanism of the lighter provides a compact and smoothly functioning unit capable of rotating the friction wheel at the speed to promote positive ignition with the least physical effort. Moreover, the transmission of power from the snuffer bar to the friction wheel through an intermediate set of gears, makes it possible to obtain the desired gear ratios and yet maintain all parts within a relatively small compass. In this connection, also, the location of the clutch and particularly the clutch spring in the intermediate gear assembly, removes the spring from proximity to the flame of the ignited wick, thus preventing it from becoming annealed with the possibility of failure and consequent frequent replacement.

Having disclosed a preferred embodiment of our invention, we claim:

1. In a lighter, the combination of a casing having a wick standard extending beyond one end thereof, a pair of parallel webs projecting from said end of the casing, ignition

mechanism mounted between said webs, a cover plate fitting over the end of said casing, and a pair of side plates secured to the outer faces of said webs and bearing at their lower edges upon said cover plate, the latter being initially bowed whereby upon the application of said side plates the same is placed under tension for the purpose described.

2. In a lighter, the combination of a casing having a depressed end wall forming a recess, a pair of parallel webs integral with said end wall and extending beyond the end of said casing, a wick standard projecting through said end wall, ignition mechanism mounted between said webs, a flanged cover plate fitting over the end of said casing and covering the depression and side plates fastened against said webs by screws and bearing at their lower edges against said cover plate, the latter being initially bowed from end to end and adapted to be straightened by the pressure of said side plates to thereby apply sufficient tension thereon to prevent the loosening of said screws.

Signed at Chicago, Illinois, this 25th day of November, 1929.

HERBERT S. STRAUSSER.

Signed at Chicago, Illinois, this 25th day of November, 1929.

HENRY T. REYNOLDS.