

Aug. 22, 1939.

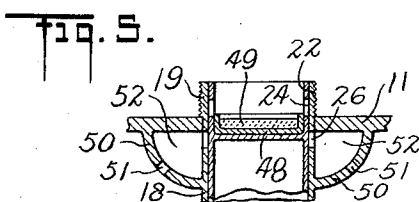
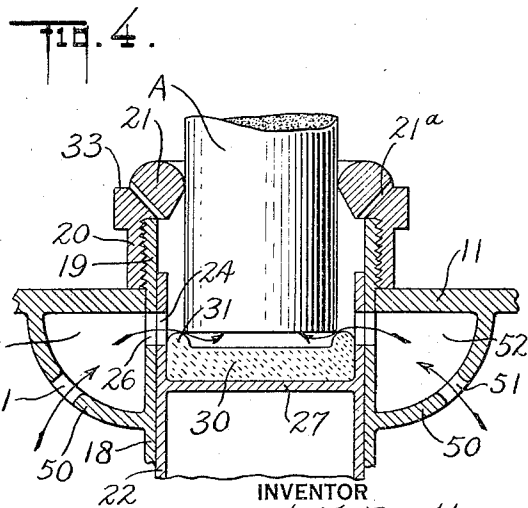
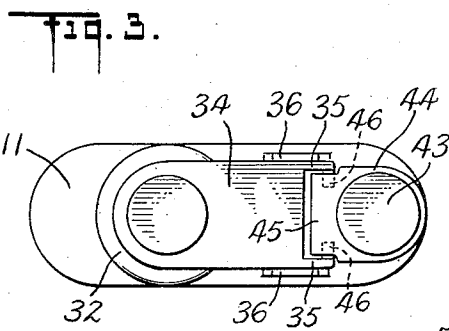
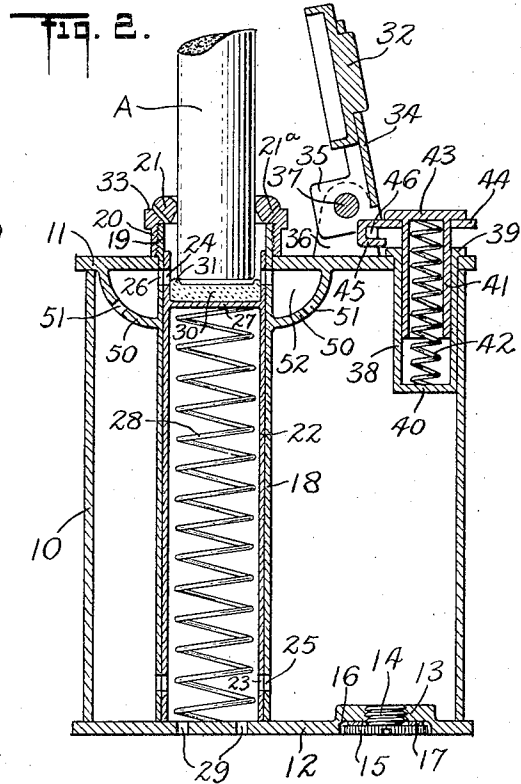
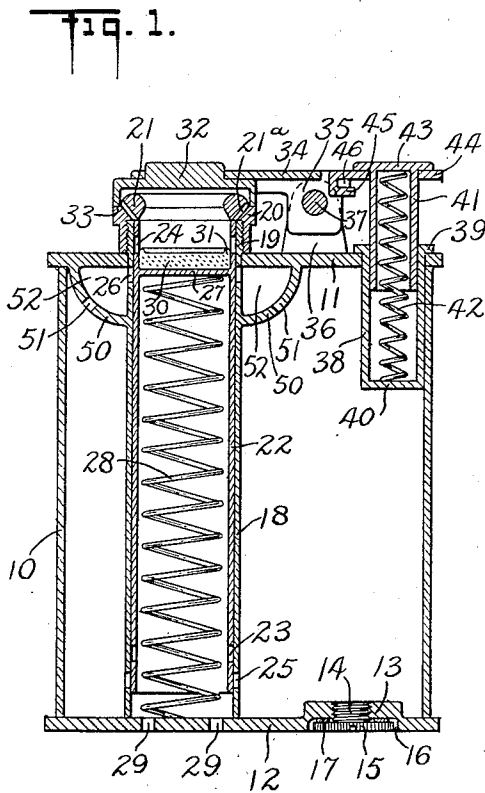
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2,170,485

CATALYTIC LIGHTER

Filed Feb. 7, 1934

2 Sheets-Sheet 1



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Fig. 6.

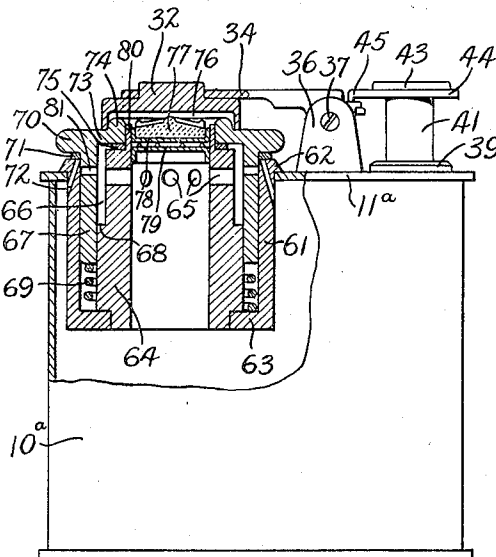


Fig. 7.

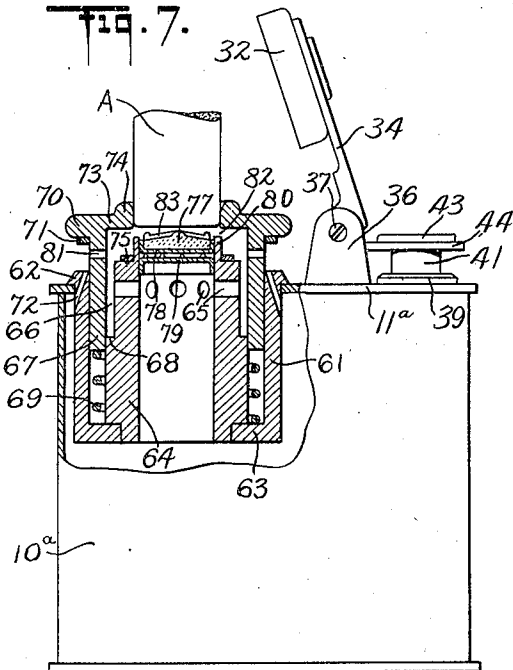


Fig. 8.

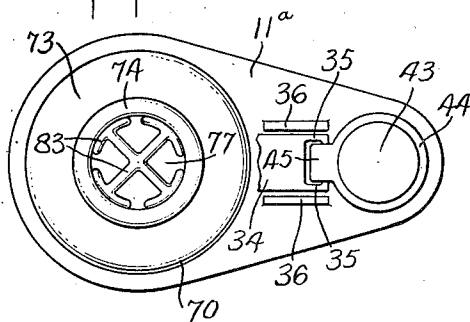
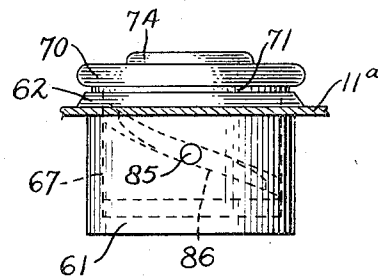


Fig. 9.



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CATALYTIC LIGHTER

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13 Claims. (Cl. 67-7)

The invention relates to lighters and, with regard to its more specific features, to lighters including a catalytic agent.

One object of the invention is to provide a pocket lighter which may be very quickly and easily operated. Another object of the invention is to provide a lighter which can be successfully used in a strong wind. Another object of the invention is to provide a catalytic agent lighter operated by manual pressure. Another object of the invention is to provide a catalytic lighter operated by depressing or moving a finger piece. Another object of the invention is to provide extremely simple and compact mechanism for controlling a catalytic lighter. Another object of the invention is to provide a catalytic lighter which shall retain a supply of fuel for a long period of time. Another object of the invention is to provide an efficient catalytic lighter. Other objects will be in part obvious and 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 drawings, in which is shown one of various possible embodiments of the mechanical features of this invention,

Figure 1 is a vertical cross-sectional view of a lighter constructed according to the invention;

Figure 2 is a view similar to Figure 1 but showing the finger piece depressed, the snuffer raised, and a cigarette in position to be lit;

Figure 3 is a plan view of the lighter showing the parts in the position corresponding to Figure 1.

Figure 4 is an enlarged sectional view of the catalytic agent and supporting structure including the vapor ports and cigarette receiving member;

Figure 5 is a fragmentary sectional view illustrating a modification of the invention involving the use of a heat insulating dish or container for the catalytic agent;

Figure 6 is a vertical cross-sectional view of a modified form of lighter;

Figure 7 is a view similar to Figure 6 but showing the finger piece depressed, the snuffer raised, and a cigarette in position to be lit;

Figure 8 is a plan view of the lighters 6 and 7, the closure arm being broken off and the cap being removed in order to more clearly show the other parts;

Figure 9 is a fragmentary side elevation illustrating a further modification of the invention.

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

Referring now to Figures 1 and 2, I provide a casing 10 constituting a fuel receptacle and which may be made in any usual or preferred manner. Desirably the casing comprises a pair of struck shells soldered together along the line of the section of Figures 1 and 2, said struck shells being suitably joined, as by soldering, to a top piece 11 and a bottom piece 12, thus providing an enclosed space for the fuel and some of the parts of the lighter as will appear.

Still referring to Figures 1 and 2, the fuel receptacle 10 may be filled with cotton or other absorbent material, not shown. I provide an orifice 13 in the bottom plate 12, this orifice having screw threads formed in it. A screw plug 14 normally closes the orifice 13, said screw plug having threads fitting those in the orifice 13 and having a head 15 which fits in a recess 16 in the bottom plate 12; I provide a washer 17 in order to tightly seal the fuel receptacle. Liquid fuel may be introduced through the orifice 13, such liquid fuel being desirably a highly volatile hydrocarbon, such as methyl alcohol or the like, but other types of fuel may be used including a solid or a semi-solid fuel capable of giving off vapor.

Extending between the top 11 and the bottom 12 is a tube 18. This tube 18 is suitably secured to the bottom plate 12, as by soldering, and extends entirely through the top 11 having a part 19 projecting above the top of the top piece 11. I form screw threads on the outside of the part 19 and thereby join to it a cylindrical member 20 which has complementary screw threads on the inside. This member 20 has an annular part 21 extending inwardly and constituting a lip to form a stop for a second tube 22 which is otherwise freely slidable inside of the tube 18. The tube 22 fits as tightly with the tube 18 as is consistent with the aforesaid free slidability; the tube 22 has a plurality of orifices 23 near its bottom end and a plurality of orifices 24 near its top end. Spaced the same distance apart lengthwise of the tube as are the respective orifices 23 and 24 are corresponding orifices 25 and 26 in the tube 18. When the parts are in the position shown in Figure 1 the orifices 23 and 25 on the one hand, and the orifices 24 and 26 on the other hand do not register, and accordingly the two tubes 18 and 22, so far as transmission of vapor is concerned, constitute in effect a closed tube. But

when the parts are in the position shown in Figure 2, the orifices 23 and 25 are in register, and also the orifices 24 and 26 are in register. The spacing of the orifices 23 and the orifices 25 around the periphery of their respective tubes and the size thereof is such that when they are in register axially they cannot be entirely out of register peripherally, and the same spacing is adopted for the orifices 24 and 26, relative angular positions of the tubes 18 and 22 being, in this embodiment of the invention, a matter of accident or chance.

Below the orifices 24 in the tube 22 but near them is a transverse dividing wall 27. In the tube 22 is a spring 28 the top of which presses against the bottom of the wall 27, and the bottom of which reacts against the bottom piece 12. Thus the tube 22 is at all times urged upwardly into the position shown in Figure 1, being prevented from rising further by the stop consisting of the annular part 21 of the cylindrical member 20. In this position of the parts, it will be remembered, none of the orifices 23 or 24 are in register with the corresponding orifices 25 and 26 of the tube 18. However, the tube 22 may be pressed downwardly against the pressure of the spring 28, and under such conditions the orifices 23 and 25 are in register, and the orifices 24 and 26 are in register.

I provide orifices 29 in the bottom piece 12 within the area defined by the tube 22 thus providing free access of air into the inside of the tubes 18 and 22. Above the wall 27 and in the tube 22 I place a catalytic disc 30 the top of which is approximately on a level with the bottom of the orifices 24. A cigarette A may be inserted in the cylindrical member 20, the annular part 21 having a diameter sufficient to receive the ordinary cigarette, and by pressing down on the cigarette against the catalytic disc 30 the tube 22 may be forced downwardly to the position shown in Figure 2, bringing the several orifices of the two tubes into register as already described. Under these conditions if the smoker draws in on the cigarette A, air will enter the orifices 29, and pass through the orifices 23 and 25 into the fuel saturated cotton in the receptacle 10; the air takes on a load of vapor and the resultant vapor passes through the registering orifices 26 and 24 over the catalytic disc 30 and so into the cigarette. Additional air to mix with the concentrated vapor is drawn into the interior of the member 20 through holes 21a.

I have so proportioned the parts, particularly the tubes 18 and 22 with respect to the size of an ordinary cigarette and also the annular part 21, that the cigarette A does not make a tight fit with the tube 22, and I also prefer to form an annular ridge 31 on the disc 30 so that the end of the cigarette will be maintained a slight distance away from a large area of the catalytic disc. Referring now to the enlarged view of Figure 4, it will be seen that the vapor goes into the cigarette after contacting a large area of the disc, and that the end of the cigarette is very close to a large area of the disc which receives the draft of vapor, and is actually in direct contact with the catalytic disc at some part of the ridge 31. The catalytic disc may be of any composition suitable for the purpose, such as platinum black or sponge platinum, and I prefer to use a catalytic agent such as of the type indicated held together by a suitable type of ceramic or the like. When such a catalytic disc receives a charge of vaporized hydro-carbon it glows very

brightly and the cigarette A will be ignited as there is some oxygen present drawn through the orifices 29. It will be observed that I have so arranged the parts that consistent with introducing vapor to the catalytic disc I have as close a contact between the cigarette A and that surface of the catalytic disc 30 which receives the vapor, as possible. In that manner the minimum of heat is lost and a highly effective cigarette lighter results. The ridge 31 constitutes a raised portion to the disc which tends to heat up more rapidly than the main body of the catalyst. I have found that it is highly desirable to have the fuel contact the top of the disc first. It will be noted that the holes or passages 21a limit the amount of oxygen to be mixed with the fuel and thus the most efficient mixture may be secured.

It is desirable to keep the catalytic disc 30 covered when not in use and also to supplement the sealing of the fuel in the receptacle 10 due to the non-register of the orifices 24 and 26 by additional sealing means. Such additional sealing means may take the form of a snuffer cap and it is further desirable to be able to lift the snuffer cap as quickly and as easily as possible, and that all these parts be located on the top of the lighter and as compact as possible. Referring to Figures 1 and 2, I provide a closure cap 32 which may be of the shape illustrated and whose downward periphery engages with a seat 33 formed on the upper part of the cylindrical member 20. I provide pivotal mounted arm 34 which may be made out of sheet metal and include a pair of downwardly extending ears 35 received between upwardly extending posts 36 secured to the top 11 of the lighter. A pin or shaft 37 (desirably in the form of a screw) extends between the posts 36 and through the ears 35 thus mounting the arm 34 for pivotal movement.

In the receptacle 10 I place a tube 38 having a flange 39 at the top and a closed bottom 40. This tube is secured to and extends through a hole in the top piece 11. Slidably mounted in the tube 38 is a tube 41, and a spring 42 is received in both tubes and presses against the closed bottom 40 and also against the under side of a finger piece or head 43 which closes the top of the tube 41. A flat piece of metal 44 has a hole in it the size of the tube 41 and is secured to the tube and to the under side of the head 43 and has a bent-over part 45 which receives laterally projecting pins 46 secured to the inside of the ears 35 and located on the arm 34 on the other side of the pin 37 from the closure cap 32. Downward pressure on the finger piece comprising the tube 41 and head 43 with a finger or thumb of the user raises the cap 32 to the position shown in Figure 2, and whenever the finger piece 43 is released, the cap 32 automatically closes against the seat 33 being retained in firm seating engagement by the pressure of the spring 42.

It will be seen that the catalytic disc 30 is, when not in use, isolated from the fuel supply and also sealed from drafts of air. I have found that these features materially heighten the effectiveness of the lighter, prevent sweating of the disc, and result in a much hotter catalytic disc when the cigarette is pressed against it than would otherwise be the case.

Referring now to Figure 5, I show a modification in the provision of an aluminum dish to hold the catalytic disc. Using the same construction

of tubes 18 and 22 and with the other parts being, of desired, substantially as already described, I provide an alumina dish 48 formed to receive a catalytic disc 49, which fits in it with a press fit. The alumina dish 48 likewise fits in the tube 22 with a press fit (as may be the case in the embodiment of Figures 1 and 2) and the lip of the dish 48 extends slightly above the top surface of the disc 49 so as to allow vapor to strike a wide surface of the disc. By the provision of an alumina holder for the catalytic agent very good heat insulation is achieved which increases the efficiency of the lighter.

In order to keep cotton from working between the tubes 18 and 22 or into the orifices 24 and 26, I provide webs 50—50 extending between the side walls of the casing 10 and secured to the bottom of the top piece 11 and also to the outer tube 18, having orifices 51 which admit air and vapor into a chamber 52 which is in communication with the orifices 26. This serves not only to keep cotton away from the orifices 26 but also provides a space for effective mixing of fuel vapor and air. With respect to the orifices 25 and 23, it is noted that the air suction being from the tubes into the cotton there is not such danger of having the cotton drawn into the tubes.

Referring now to Figures 6 and 7, a modification of the invention is disclosed in which the receptacle 10a, of the shape shown in Figures 6 and 8, receives a wide cylindrical member 61 which is attached to and depends from the top wall 11a, there being a lip 62 on the cylindrical member 61 to facilitate its connection to the top wall 11a. The member 61 has an inwardly extending annular ledge 63 at the bottom thereof, which seats and supports an inside cylindrical member 64. The bottom of the member 64 is open to the inside of the fuel receptacle 10a, and a plurality of holes 65 lead the vapors from the fuel receptacle into a passage 66 between the outside wall and the cylindrical member 64 and a slidable sleeve 67.

The sleeve 67 fits between the cylindrical members 61 and 64, there being a shoulder 68 on the outside of the cylindrical member 64 constituting the division between two diameters thereof in order to provide the passage 66.

This embodiment of the invention includes the finger piece 43, snuffer arm 34 and closure cap 32 and associated parts substantially as already described, and the spring 42, when the lighter is not being used, holds the sleeve 67 in the downward position of Figure 6 against the pressure of a spring 69. In this position of the parts an outwardly extending flange 70 of the sleeve 67, and a washer 71 affixed to it, closes a series of ports or passages 72 extending downwardly and at a sharp angle through the cylindrical member 61 as shown, thus sealing the inside of the receptacle 10a and preventing the escape of liquid fuel.

The sleeve 67 has also an inwardly extending annular flange 73 which has an annular ridge 74. When the cap 32 is in closed position, the under side of the flange 73 seats against a washer 75 on the top of the cylindrical member 64 and thus seals the passage 66 from a chamber 76 constituting the inside of the cap 32 and having in it a catalytic member 77 received in a metal cup 78 which rests on an inverted cup-shaped member 79 that fits in the inside of the cylinder 64 with a press fit. The lip of the cap 32 engages the side of the ridge 74 and also the top of the sleeve 67, and therefore when the lighter is not in use

the catalytic member 77 is isolated not only from the vapors of the fuel receptacle but also from moisture in the atmosphere, dust, dirt and the like. I have found that these catalytic discs have a tendency to absorb moisture, and when they have done so they will not operate until dried out. A much greater efficiency of the lighter is insured by sealing the disc from the atmosphere as well as from fuel vapors at all times when not in use.

It will be seen that the catalytic disc 77 and its retaining cup 78 is supported not only by the inverted cup 79 but also by an upwardly extending sleeve portion 80 of the cylindrical member 64. I have mentioned that the inverted cup 79 is press fitted in the cylindrical member 64, but wish to note that a vapor tight joint is preferably made and for this purpose any suitable sealing compound or gasket may be employed.

The lighter is operated as in the embodiment already described, for when the finger piece 43 and plunger 41 are depressed the cap 32 is raised, and the spring 69 then forces upwardly the sleeve 67. By this action the ports 72 are uncovered, and the passage 66 is opened up so that the fuel vapors can reach the top but not the bottom of the catalytic disc 77. At the same time ports 81 in the sleeve 67, which were ineffective when the parts were in the position shown in Figure 6, are opened up to the atmosphere, allowing a measured amount of oxygen to be drawn into the now formed chamber 82 which is a continuation of the passage 66.

The cigarette A as shown in Figure 7, fits fairly closely to the internal wall of the flange 73 and ridge 74, and comparing Figures 7 and 8 rests upon a set of ridges both radial and peripheral 83 formed on the top of the disc 76. As shown in Figure 8, these ridges 83 are approximately in the form of a cross potent, and as already noted the heat created in the main body of the catalyst by contact of the gases of the top surface thereof has a tendency to concentrate in the ridges producing a higher temperature there. Whether this action is one of heat conduction or whether the combustion is greatest in the ridges I am not prepared to state but I find that a hotter contact point can be produced by forming the catalyst as shown in these figures. At the same time it will be noted that the cross potent ignites the cigarette on the periphery thereof and also across the same, and the remaining area quickly ignites from the lighted area and thus a good light and an even burning cigarette is assured. The receiver constituting the ridge 74 and the walls thereof has the effect of locating the cigarette at the most efficient point on the catalytic disc 77.

Referring now to Figure 9, I may if I desire raise and lower the sleeve 67 by a screw or cam action. As indicated in Figure 9 I place a couple of pins 85 in the cylindrical member 61 projecting into a slanting slot 86 in the sleeve 67, so that turning of the sleeve 67 raises and lowers it.

It will thus be seen that there has been provided by this invention a lighter 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

drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a lighter, in combination, a fuel receptacle having an elongated top wall, a finger piece mounted for downward movement on said top wall, a closure cap, an arm for said closure cap, a pivotal mounting on said top wall and between said finger piece and said closure cap, spring means mounted to urge said cap downwardly and said finger piece upwardly, a cylindrical member having a seat mounted on said top wall with a seat under the closure cap, a tube extending into said receptacle with its upper end received in said cylindrical member, an inwardly extending lip formed on said cylindrical member, a second tube slidably mounted in said first tube, there being orifices in said tubes near the top thereof, and there being orifices in said tubes near the bottom thereof, a spring urging said second tube upwardly in said first tube in which position of parts the several orifices are out of register, the orifices being so located that when the second tube is depressed the several sets of orifices are in register, there being an orifice in the bottom of the lighter admitting air to the two tubes, a transverse wall blocking the second tube between the several sets of orifices, and a catalytic disc in the second tube, whereby when the second tube is depressed air may be drawn through the orifice in the bottom of the lighter through the lower registering orifices then through the inside of the fuel receptacle then into the tubes through the upper orifices and over the disc.

2. A lighter as claimed in claim 1, the combination with the parts and features therein specified of a marginal annular ridge on said catalytic disc.

3. In a lighter, in combination, a disc including catalytic material, a mounting for said disc, a fuel receptacle, a marginal annular ridge on one side of said disc, and passages admitting vaporized fuel from the fuel receptacle to that side of the disc having the ridge.

4. In a lighter, a fuel receptacle, a tube in said fuel receptacle fixed in relation to the walls thereof, an inner tube in the first named tube and slidably mounted therein, there being an orifice to admit atmospheric air into the inner tube and there being orifices in each tube near the bottom thereof adapted to admit air from the inside of the inner tube into the fuel receptacle, and there being orifices near the top of each of the tubes adapted to admit air and vaporized fuel from the fuel receptacle into the inside of the inner tube, a catalytic disc in the upper part of said tubes, and means resiliently urging the inner tube into such a position as to move the orifices out of register but permitting them to be moved back into register to allow vaporized fuel and air to be drawn from the receptacle onto said disc.

5. In a lighter, a pair of tubes one inside the other, there being orifices in the inner tube, a

catalytic disc in the inner tube located just under said orifices, means urging the inner tube upwardly with respect to the outer tube, and there being orifices in the outer tube adapted to be brought into register with those in the inner tube when the inner tube is moved downwardly, and means admitting vaporized fuel to the orifices.

6. In a lighter, a fuel receptacle, a catalytic disc, a mounting for said catalytic disc permitting a cigarette to be placed on top thereof, mechanism opening a passage to the top of said disc from said fuel receptacle when said disc is depressed by a cigarette, and resilient means to urge said disc upwardly.

7. In a lighter, a fuel receptacle, a cigarette receiving member on the top of said receptacle, a closure cap for said receiving member, downwardly movable finger piece means to raise said closure cap, a catalytic disc within said cigarette receiving member normally isolated from the fuel, and an arrangement whereby said disc may be depressed admitting vaporized fuel to said catalytic disc from said receptacle thereby.

8. In a lighter, in combination, a pair of tubes one inside the other, a cylindrical member formed to receive a cigarette attached to the outer tube and having a lip overlying the inner tube, a transverse wall in the inner tube, orifices in the inner tube just above the transverse wall, a spring in the inner tube forcing it upwardly in the outer tube, orifices in the outer tube which when the inner tube is depressed register with the orifices in the inner tube, a catalytic disc between the orifices of the inner tube and the transverse wall, and means containing a supply of fuel in communication with the orifices in the outer tube.

9. In a lighter, in combination, a catalytic disc, a cigarette receiving member above said catalytic disc, means urging said disc upwardly, a fuel receptacle, and means arranged to connect the upper part of said disc with said fuel receptacle for the admission of vapor to the upper part of said disc and adapted to be operated by a cigarette pressing said disc downwardly.

10. In a lighter as claimed in claim 9, the combination with the parts and features therein specified of a closure cap for the cigarette receiving member.

11. In a lighter as claimed in claim 9, the combination with the parts and features therein specified of a closure cap for said cigarette receiving member, a finger piece to raise said closure cap, and spring means urging said closure cap into closing position.

12. In a lighter, a fuel receptacle, an impervious dish-shaped metal container above said receptacle, a catalytic disc located in said container and in proximity to said receptacle, means to admit vaporized fuel to the top only of said disc, and means to admit air to the top only of said disc.

13. In a lighter, a metal dish, a catalytic disc in said dish, and a ridge in the form of a cross on the top of said disc.

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