

Nov. 7, 1950

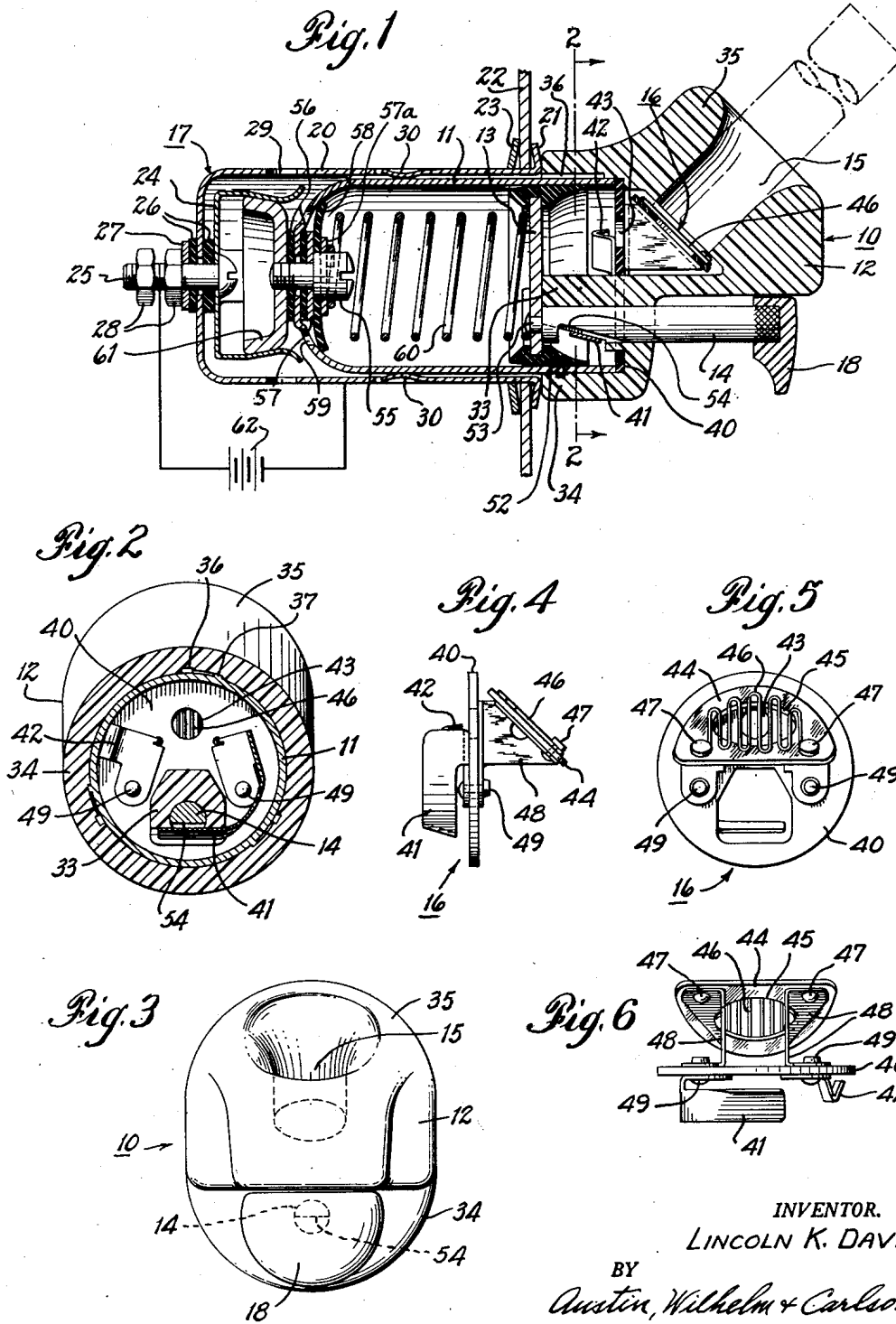
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2,528,500

CIGARETTE LIGHTER

Filed Jan. 20, 1948

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 7

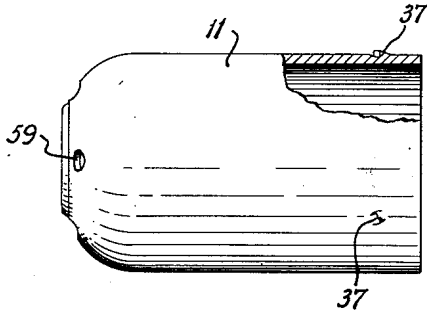


Fig. 8

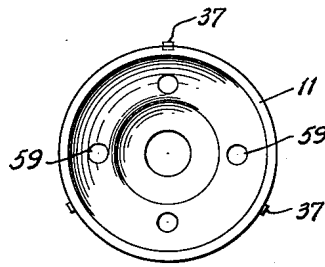


Fig. 9

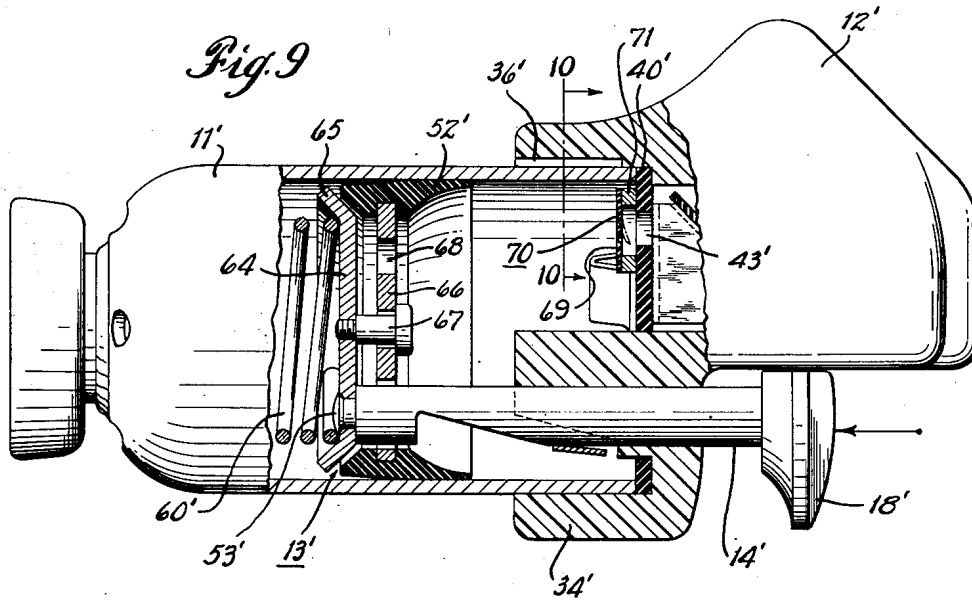
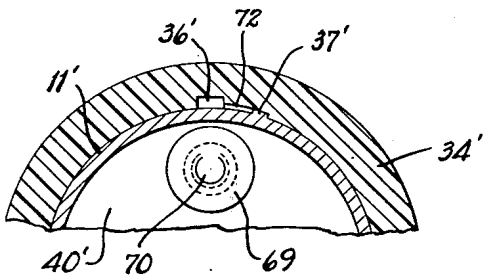


Fig. 10



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# UNITED STATES PATENT OFFICE

2,528,500

## CIGARETTE LIGHTER

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6 Claims. (Cl. 219—32)

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The invention relates to cigarette lighters, more particularly to electric cigarette lighters for use on the dashboard of automobiles.

Among the principal objects of the invention are to provide a lighter in which a cigarette may be inserted and lighted while in inserted position; to provide a lighter which the driver of a car may use without distracting his attention from the road; to provide a lighter which fits in the conventional lighter socket, usually present on automobiles, for the so-called "cordless" lighters; to provide a lighter which is simple to operate, inexpensive to manufacture and reliable in use.

According to a preferred form of the invention, the cigarette lighter comprises a tubular body adapted to fit a conventional automobile dashboard socket; the body has a projecting inclined knob having an inclined cigarette-receiving orifice. The body includes a cylinder and piston; the piston has an eccentric piston rod projecting out under the knob and having a button by which the piston may be pumped back and forth to light a cigarette. At the inner end of the cigarette-receiving opening is an electric igniter element. The parts are so arranged that pushing in of the button, to work the pump, causes air to flow outwardly through the igniter element and through the cigarette, thus puffing the cigarette and lighting it while it is in the lighter.

The invention also consists in certain new and original features and combinations hereinafter set forth and claimed.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, and the manner in which it may be carried out, may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part hereof, in which:

Fig. 1 is a longitudinal vertical section through the preferred lighter showing its position in a conventional type lighter socket on the dashboard of an automobile;

Fig. 2 is a transverse section on the line 2—2 of Fig. 1;

Fig. 3 is a front view of the lighter as seen from the front seat of the automobile;

Fig. 4 is a side elevation of the igniter assembly;

Fig. 5 is a front view of such assembly looking from right to left of Fig. 4;

Fig. 6 is a bottom plan view of the igniter assembly as it would appear, looking upwardly, with the assembly in position shown in Fig. 1;

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Fig. 7 is a side elevation of the cylinder only; Fig. 8 is an end elevation of the open end of the cylinder;

Fig. 9 is an enlarged side elevation, and partial central section, of a modified form of lighter with the knob pressed inwardly to an intermediate position; and

Fig. 10 is a detail on the line 10—10 of Fig. 9.

In the following description and in the claims, various details will be identified by specific names for convenience, but they are intended to be as generic in their application as the art will permit.

Like reference characters denote like parts in the several figures of the drawings.

In the drawings accompanying and forming part of this specification, certain specific disclosure of the invention is made for purposes of explanation, but it will be understood that the details may be modified in various respects without departure from the broad aspect of the invention.

Referring to Figs. 1 to 6, the lighter, in general, comprises a lighter body 10 shown inserted in the conventional dashboard socket, one type of which is shown somewhat diagrammatically at 17. The main parts of the lighter body 10 include a cylinder 11, a knob 12, piston 13, push rod 14 and pushbutton 18. The knob has an oblique cigarette hole 15 in which a cigarette is shown in position to be lighted, the cigarette being disposed against the igniter element of igniter assembly 16.

It will be understood that the cigarette is lighted by moving button 18 back and forth to make the piston 13 reciprocate in cylinder 11. This movement energizes the igniter 16 and forces air outwardly through the igniter and cigarette to light the cigarette. For convenience of description, the words "inner" and its derivatives is used to indicate the end of the lighter and associated apparatus away from the operator, while the term "outer" and its derivatives is used to indicate the end of the lighter toward the operator; the direction "in" means away from the car operator, the direction "out" means towards the car operator.

The automobile dashboard socket, indicated by 17, will first be described. This comprises a tubular metal body 20 having an outer flange 21 engaging the dashboard 22 of an automobile and provided with retaining means, as for example, ring 23, to hold the socket in position on the dash. The inner end of such socket is ordinarily provided with a bimetal member 24 having a series of fingers. The member 24 is secured to

the inner end of the body 20 by a bolt 25 passing through the finger member and through an enlarged hole in the end of the tubular body 20. Insulating washers, indicated by 26, and a metal washer 27 surround bolt 25 and the whole assembly is clamped by nut 28 to the inner end of body 20 in such way that the bolt 25 and contact finger member 24 are electrically insulated from the metal body 20. The metal body 20 may be provided with vents 29 and struck-out contact strips 30 to tightly engage the cylinder 11 of the lighter body 10.

The lighter body 10 comprises the metal cylinder 11 and the plastic knob 12. The knob 12 has an opening for piston rod 14 and a projecting guide post 33 to help guide the piston rod 14 which is off-center from the piston 13. The knob 12 is also provided with a sleeve 34 which receives the end of metal cylinder 11. The plastic knob 12, which is of electric insulating material, has a diagonal projection 35 in which is the flared cigarette hole 15. The knob 12 also has an interior recess for the igniter assembly 16 described more in detail below.

The interior of sleeve 34 has a plurality of longitudinal grooves 36 (see also Fig. 2) to receive cooperating nibs 37 (see Figs. 7 and 8) struck out of the outer wall of metal cylinder 11. These nibs 37 cooperate with the slots 36 to hold the knob and cylinder conveniently assembled. This construction is described and illustrated more in detail in connection with the modified form shown in Figs. 9 and 10.

The igniter assembly 16 comprises an insulating contact plate 40 (see also Figs. 4 to 6) which is disposed between the end of cylinder 11 and the bottom of the sleeve 34 on the knob when the lighter is assembled. The contact plate 40 supports a flexible contact finger 41 and a ground clip 42. It has a hole 43 connecting the cylinder space with the heater space. The contact plate 40 is connected to an igniter base 44, which may be made of mica or some other heat resisting material, through spaced gusset or igniter lugs 48 (see particularly Fig. 6). The igniter base 44 has a large opening 45 over which is located the resistance wire 46; this is bent back and forth in zigzag fashion but retained in generally planar formation. The zigzag loops of resistance wire overlap the opening 45 to provide support for the resistance wire but for its greater extent the resistance wire is unbacked by the igniter base 44. This open construction, with the large hole 45 extending substantially the entire area of the planar heater element, has advantages explained hereinafter. The hole 45 is substantially round and of substantially the area of the end of a conventional cigarette.

The ends of the resistance wire 46 are connected respectively to the gussets 48 by rivets 47 passing through the igniter base 44. Likewise, the contacts 41 and 42 are connected to the gussets 48 by rivets 49 passing through contact plate 40. This construction provides an electrical path from flexible contact finger 41 through the resistance wire back to ground clip 42, as will be explained below.

The piston assembly comprises the metal piston plate 13 having a rubber ring 52 surrounding the edge thereof and engaging the walls of the cylinder 11. The piston rod 14 is connected to plate 13 by integral rivet 53. The outer end of piston rod 14 may be knurled or roughened to improve the bond between it and the pushbutton 18 which may be of electric insulation material

and molded on the end of rod 14. The pushbutton 18 has a flattened top cooperating with a flattened lower surface on the knob 12 (see Fig. 3).

The piston rod 14 has a recess 54 for the purpose of clearing the contact finger 41 when the push rod 14 is in outer or normal position. It will be understood that the pushing in of button 18, to operate the lighter, causes the metal push rod 14 to engage contact finger 41 to close the electric circuit through the resistance element, as explained hereinafter.

The nature of the rubber packing ring 52 is such that it not only insulates the metal piston plate 53 from metal cylinder 11, but it also acts as a kind of one way valve. That is to say, when the pushbutton 18 is pressed inwardly, it tends (for reasons that will appear) to build up pressure on the left hand side of piston 13 in Figure 1. This pressure causes the rubber packing ring 52 to collapse and the air to pass by to the right hand side of piston 13. However, after piston 13 is in its innermost position and the spring 60 pushes it to the right in Figure 1, the air pressure built up in front of piston 13 acts to seal the packing ring 52 against the walls of the cylinder, causing the air to pass outwardly through hole 43 in contact plate 40 and through the igniter wire 46 and out through the cigarette.

The outer end of cylinder 11 preferably is of slightly larger internal diameter than the working portion, to allow packing ring 53 to expand slightly in its outermost or rest position; this prevents its taking a set which in time might, in turn, prevent proper air sealing during its outward stroke.

The inner end of cylinder 11 is provided with a screw 55 threaded into a dished terminal nut member 61 which engages the bimetallic fingers 24. It will be noted that the engagement of sleeve 34 of knob 12 against the flange 21 of the lighter socket 17 limits the innermost position of the nut member 61.

The inner wall of cylinder 11 has an enlarged opening through which the screw 55 passes in spaced relation. Insulating washers 56 are placed on opposite sides of the end wall of cylinder 11. Also mounted on screw 55 is a metal washer 57. The entire assembly of washers is tightly clamped by the tightening of terminal nut 61 on screw 55, so as to electrically insulate the screw 55 from the end of cylinder 11. Surrounding the head of screw 55 is flexible rubber valve disc 58 and a metal washer 57a held in place by the eye of spring 60 which tightly grips the head to screw 55 to obtain good electrical connection.

The flexible washer 58 cooperates with the dished end of the cylinder 11 to form an air seal to control air admissible through a series of holes 59 in the end of cylinder 11. The valve disc 58 acts as a check valve permitting air to be drawn through holes 59 from the outside of cylinder 11 to the inside, but preventing air flow through these holes in the opposite direction. The helical spring 60 which grips the head of screw 55 and engages washer 57 also engages the piston plate 13 for the dual purpose of establishing electrical connection between screw 55 and plate 13 and to urge piston 13 outwardly whenever it is pressed inwardly by pushbutton 18.

The lighter operates as follows. The user first places a cigarette in the cigarette hole 15 with the end against the resistance wire as illustrated in Fig. 1. The user then pushes in on the button 18 allowing the spring 60 to return the piston; this

pumps the piston back and forth. Several complete strokes may be necessary before smoke is observed passing freely through the free end of the cigarette. This indicates that the cigarette is lighted; it may then be removed from the lighter for smoking.

It will be noted that, when the button 18 is pressed in, the piston tends to generate pressure in the inner end of the cylinder, which pressure causes the valve disc 58 to close the end of the cylinder. This compresses the air in front of the piston and this air passes by to the outer side of the piston, as explained above.

The spring 60 is available to cause outward movement of the piston, forcing air in front of the piston through the hole 43 in the contact plate, through the hole 45 in the igniter plate, and through the resistance wire 46 and thence through the cigarette. At the same time air is sucked in behind the piston through the holes 59 in the inner end of the cylinder, which opens the check valve disc 58.

The initial pushing in of the piston causes engagement between the contact spring finger 41 and the piston rod 14; this completes the circuit through the resistance element thereby lighting it. This circuit is as follows. The car battery is indicated by 62; one pole is shown connected to live screw 25, the other pole is shown connected to socket 29 which is grounded to the car frame. Starting with the bimetallic contact fingers 24 which are alive, the electricity passes through the terminal nut 61, through the fastening screw 55, thence to spring 60, to the piston head 13, push rod 14, contact finger 41, one igniter lug 48, resistance wire 46, other igniter lug 48, ground clip 42 and metal cylinder 11 which is grounded to socket 20.

It has been found that keeping the cigarette smoke out of the cylinder 11 as much as possible helps prevent the smoke residue, which is in the nature of a sticky or gummy tar, from forming on the cylinder walls. The end check valve 58 and the collapsible rubber piston packing 52 provide a one-way air flow and this largely helps prevent entry of smoke into the cylinder.

It has also been found that the use of the large opening 45 immediately behind the resistance wire 46 helps minimize smoke formation on the inward movement of the piston. Apparently the contact between the tobacco and the incandescent ignition wire, when not closely backed with heat retaining material, such as a body of mica, is insufficient to ignite the tobacco except when the piston is moving outwardly and pushing a draft of air outwardly through the igniter into the cigarette. Apparently it takes the contact heat from the incandescent wire, plus a flow of hot air into the cigarette, to provide enough heat to burn the tobacco.

Referring now to Figures 9 and 10, a modified form of lighter is shown. This form closely follows the form shown in Figures 1 to 8 except that in the second form a special piston 13' is provided and a special check valve 70 is provided in the contact plate 40'. Except for these changes, the construction is the same as in Figures 1 to 8 and corresponding parts are given the same reference characters with primes added for simplicity.

The differences will now be described. The piston comprises piston plate 64 rigidly connected to push rod 14' by the rivet 53'. This plate has an annular bevel 65. Alongside plate 64 is a second plate 66 on which the rubber packing ring 52' is

mounted. Plate 66 has holes 68. A screw 67 passes loosely through plate 66 and is tightly threaded into plate 64. This construction permits axial play between plates 64 and 66. Thus, when the pushbutton 18' is pressed inwardly, the annular ring 65 moves away from packing ring 52' providing a positive passage for the air from the left side of the piston in Figure 9 to the right side. When the piston moves from left to right under the pressure of spring 60', the beveled valve flange 65 seats against the cooperating bevel on packing ring 52' closing the piston valve and pushing all the air in the chamber at the right of the piston out through the check valve 70 and hole 43' in contact plate 40' and out through the cigarette, as explained in connection with Figures 1 to 8.

The contact plate 40' has a washer 71 suitably secured around the periphery of hole 43'. Suitably secured to washer 71 is a check valve plate 69. This plate may be of rubber, or some other soft material, and has an incomplete circular slit cut into it to form a swinging flap 70. The slit is cut conical forming a bevel edge on flap 70 and a bevel seat on plate 69. Flap 70 acts as a check valve permitting air to pass from the cylinder 11' out through the cigarette but preventing return movement of air, or smoke, or products of combustion.

Either the special piston 13', or the special check valve 70, or both, may be used to help prevent entry of smoke into the cylinder, but, as above stated, the construction shown in Figures 1 to 8 is sufficient in most cases to eliminate difficulties due to deposits of tar on the cylinder walls interfering with the pumping action of the piston.

The arrangement for holding the knob 12' assembled with respect to cylinder 11' includes the longitudinal grooves 36' cut in the internal surface of sleeve 34'. The nibs 37' on cylinder 11' are struck in such way that the outer edges of the nibs lie along the lines of a helix. Thus, as the sleeve 34' is pushed down over the cylinder 11' the nibs 37' enter the grooves 36' until the knob 12' is pushed in against the cylinder 11' all the way, then the knob 12' is given a twist clockwise with respect to cylinder 11'. This causes the sharp nibs 37' to cut short helical thread grooves, indicated by 72 in Figure 10, in the inner surface of sleeve 34', thus tightly and fixedly anchoring the knob 12' onto the cylinder 11'.

Thus a cigarette lighter is provided, which can be inexpensively made, which is easy to install in a conventional lighter opening and which is easy to operate, even by a driver while driving an automobile. It is only necessary to impart a few short strokes to the pushbutton and the inserted cigarette is lighted. The parts are capable of inexpensive mass production, assembly is simple, and the completed lighter is reliable.

While certain novel features of the invention have been disclosed herein, and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In a cigarette lighter, a body comprising a metal cylinder having an insulating knob secured to the outer end thereof, said knob having an off-center opening and a cigarette-receiving hole, a piston comprising a metal piston plate and having a flexible sealing ring secured thereto slidable in said cylinder, said piston incorpo-

rating a check valve, a metal piston rod fixedly secured to said plate and passing out through said off-center opening, said rod having a recess, an electrical contact member passing through the inner end of said cylinder and insulated from said cylinder, a helical spring bearing against said contact member and against said piston plate, an igniter assembly comprising a contact plate seated in said knob, said contact plate having a ground clip contacting said cylinder and a flexible finger disposed in said recess, resistance wire at the inner end of said cigarette-receiving hole, support members connecting the ends of said resistance wire respectively to said contact finger and ground clip.

2. In a cigarette lighter, a body comprising a metal cylinder having an insulating knob secured to the outer end thereof, said knob having an off-center opening and an oblique cigarette-receiving hole, a piston comprising a metal piston plate and having a flexible sealing ring secured thereto slidable in said cylinder, said piston incorporating a check valve, a metal piston rod fixedly secured to said plate and passing out through said off-center opening, said rod having a notch, an electrical contact member passing through the inner end of said cylinder and insulated from said cylinder, a helical spring bearing against said contact member and against said piston plate, an igniter assembly comprising a contact plate seated in said knob, said contact plate having a ground clip contacting said cylinder and a flexible finger disposed in said notch, an igniter base at the inner end of said cigarette-receiving hole, resistance wire on said igniter base, support members connecting said igniter base and said contact plate and electrically connecting the ends of said resistance wire respectively to said contact finger and ground clip, the inner end of said cylinder having an opening, a flexible disc seated over said opening and adapted to permit air to enter said cylinder from the outside but to prevent contrary flow of air.

3. In an electric cigarette lighter for use on the dashboard of automobiles and the like, said dashboard having a socket, a lighter casing comprising a cylinder and a body secured to the outer end of the cylinder, said cylinder being adapted to be inserted within said socket with said body projecting from the socket, a piston in said cylinder, said piston having an eccentrically disposed piston rod at the side thereof below the axis of the cylinder, said body having a guide portion to slidably receive said piston rod, said body having an obliquely upwardly extending cigarette-receiving opening above said piston rod, an electric igniter element at the inner end of said opening, and means to move said rod to force air out through said igniter element and cigarette opening and to energize said igniter element.

4. In a lighter for cigarettes or the like, a casing comprising a cylinder and a body secured to the outer end of said cylinder, a piston in said cylinder, a push rod connected to said piston, said rod projecting outwardly through the outer end of the casing, an igniter element in said casing in communication with, and at the outer end of, said cylinder, said body having an opening for snugly holding a cigarette adjacent said igniter element, said cigarette-receiving opening having air tight connection with the outer end of the cylinder, a compression spring between the inner end of said cylinder and said piston, said spring normally holding said rod in outer

position, vent means at the inner end of said cylinder, said piston having check means for passing air from the inner end of said cylinder to the outer end thereof when the piston rod is pushed inwardly, said piston forcing air ahead of it, when the compression spring pushes said piston outwardly, through said igniter element and inserted cigarette.

5. In an electric lighter for cigarettes and the like, a casing comprising a cylinder and a cigarette holding member at the outer end of the cylinder, an igniter assembly comprising an insulation plate disposed across the end of said cylinder, said plate carrying spaced supports, an igniter element including resistance wire mounted on said supports, said holding member having a cigarette-receiving opening for holding a cigarette adjacent said igniter element, said insulation plate carrying electrical contacts, said supports providing electrical connection between the ends of said resistance wire and said contacts, a piston in said cylinder, a rod connected to said piston and extending outwardly, said rod having a clearance space in which one of said contacts is normally located, movement of said piston establishing electrical connection between said rod and said one contact and forcing air through the resistance wire and cigarette, said other contact comprising means to complete an external electric circuit.

6. In a lighter for cigarettes and the like, a casing comprising a cylinder and a body secured to said cylinder at the outer end of said cylinder, a piston in said cylinder, a push rod secured to said piston, said rod projecting through the outer end of said cylinder, a spring operating between the inner end of said cylinder and said piston to urge said piston outwardly, said rod having a circuit-opening portion, an electric igniter in said body, electric connections to said igniter including a contact finger normally disposed at said circuit-opening portion, said body having a cigarette-receiving opening for holding a cigarette in proximity to said igniter, said opening being in communication with the interior of said cylinder, said push rod being engageable with said contact finger upon pushing said rod inwardly, said push rod being engageable with said contact finger throughout a substantial part of the length of said rod to make electrical contact to energize the igniter element while said spring is urging said piston outwardly and forcing air through said igniter and inserted cigarette.

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#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

| Number    | Name          | Date          |
|-----------|---------------|---------------|
| 1,335,251 | McIntyre      | Mar. 30, 1920 |
| 1,379,492 | Wagner        | May 24, 1921  |
| 1,844,206 | Copeland      | Feb. 9, 1932  |
| 1,849,795 | Fenton        | Mar. 15, 1932 |
| 1,959,093 | Davis         | May 15, 1934  |
| 1,983,738 | Davis         | Dec. 11, 1934 |
| 2,010,675 | Lewis         | Aug. 6, 1935  |
| 2,012,819 | Hueber et al. | Aug. 27, 1935 |
| 2,090,830 | Bullock       | Aug. 24, 1937 |
| 2,243,889 | Shively       | June 3, 1941  |
| 2,244,269 | Springborn    | June 3, 1941  |
| 2,340,773 | Shively       | Feb. 1, 1944  |