

Aug. 26, 1958

J. C. EVANS

2,849,585

OPTICAL CIGARETTE LIGHTER

Filed Nov. 8, 1956

2 Sheets-Sheet 1

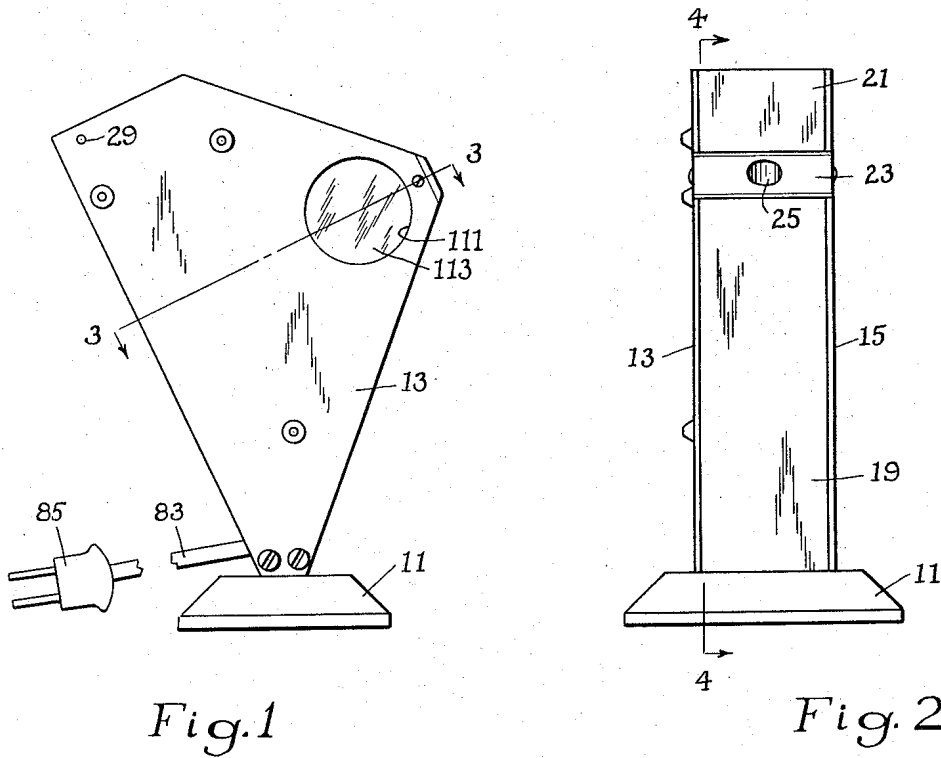


Fig. 1

Fig. 2

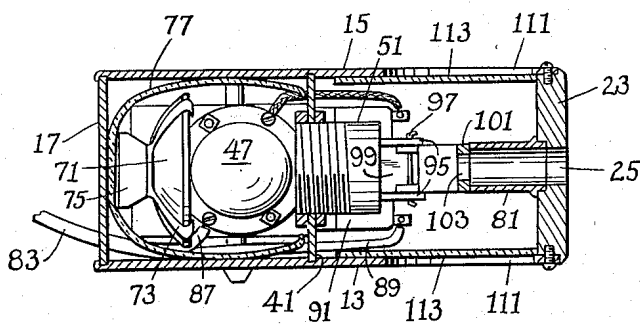


Fig. 3

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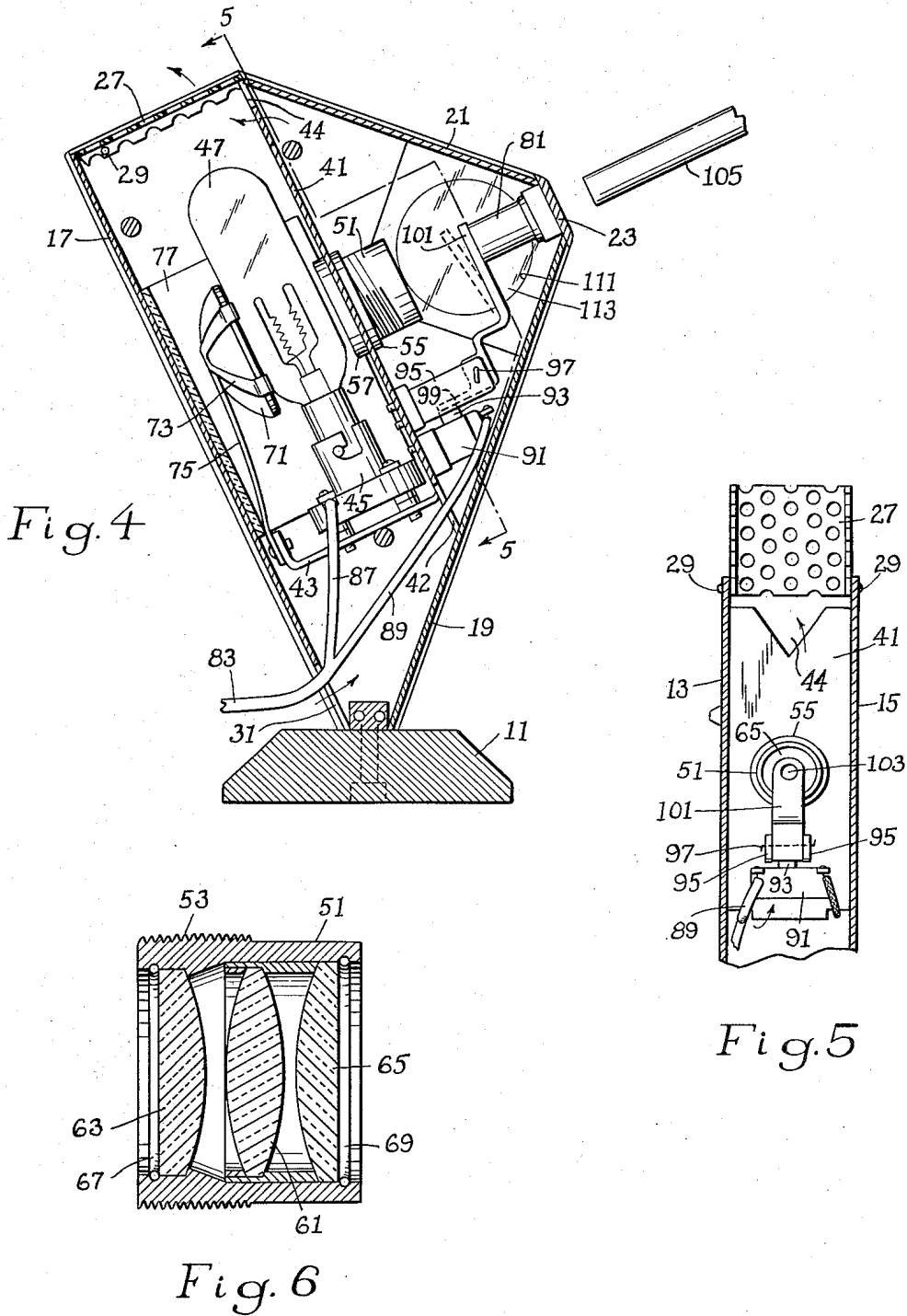
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OPTICAL CIGARETTE LIGHTER

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Application November 8, 1956, Serial No. 621,166

14 Claims. (Cl. 219—32)

This invention relates to a cigarette lighter in which the tobacco of the cigarette is brought to ignition temperature by the concentrated and focused rays of light from a source of illumination, in somewhat the way that ignition is sometimes achieved by concentrating the rays of sunlight by means of a lens or burning glass. Hence the lighter may be referred to as an optical cigarette lighter.

An object of the invention is the provision of a generally improved and more satisfactory cigarette lighter.

Another object is the provision of a cigarette lighter which is so different both in appearance and in function from conventional lighters that it may be regarded as a novelty, thus exciting the interest and curiosity of bystanders.

Still another object is the provision of an electrically operated cigarette lighter so designed as to require only a low current input, and to be safe in normal use against accidental contact of a hot element with anything not intended to be ignited.

A still further object is the provision of a cigarette lighter so designed and constructed as to be relatively safe against misuse or dangerous use by children or pranksters.

These and other desirable objects may be attained in the manner disclosed as an illustrative embodiment of the invention in the following description and in the accompanying drawings forming a part hereof, in which:

Fig. 1 is a side elevation of a cigarette lighter in accordance with a preferred embodiment of the invention;

Fig. 2 is a front elevation or edge view of the same;

Fig. 3 is a section taken approximately on the line 3—3 of Fig. 1, looking downwardly;

Fig. 4 is a vertical section taken approximately on the line 4—4 of Fig. 2;

Fig. 5 is a section approximately on the line 5—5 of Fig. 4, but with the cover raised; and

Fig. 6 is an enlarged axial section through the condensing or concentrating lens assembly.

The same reference numerals throughout the several views indicate the same parts.

In the preferred embodiment of the invention, there is a base member 11 adapted to rest upon any level surface such as a table, from which rise two side walls 13 and 15, located substantially parallel to each other and of irregular polygonal shape as seen in Fig. 1, the general shape of the lighter constituting the first element of novelty initially attracting the interest of the onlooker.

Extending between the rear edges of the side walls is a rear wall 17 (Figs. 3 and 4). A lower front wall section 19 and an upper front wall section 21, both extending between the side walls 13 and 15, are arranged approximately at right-angles to each other and at about 45 degrees to the rear wall 17, as seen in Fig. 4, but terminate somewhat short of the corner of intersection of the planes of these two walls with each other, the gap at the corner being filled with a wall member 23 approximately parallel to the rear wall 17 and of thicker and more substantial material than the rather thin sheet material from which the

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other walls are formed. This wall 23 contains the aperture 25 into which the cigarette to be ignited is thrust endwise.

A top wall 27 is of foraminous material, preferably perforated sheet metal, and is hinged near its rear edge on a pivot 29, so that it may be swung upwardly to obtain access to the interior of the device for replacement of the electric bulb if it becomes burned out. The perforations in the top wall 27 allow escape of hot air. Circulation of cooling air through the device is possible because of an air inlet opening 31 (Fig. 4) at the bottom of the rear wall 17.

Within the casing or enclosure constituted by the walls above mentioned, there is a fixed partition 41 arranged approximately parallel to the rear wall 17. Part of the cooling air which flows in through the opening 31 and out through the perforated member 27 circulates through the front compartment by passing through an inlet opening 42 at the bottom and an outlet opening 44 at the top of the partition 41. From the fixed partition 41 there is supported a bracket 43 on which is mounted a lamp base 45 preferably of the bayonet type, to receive a light bulb 47 having a high intensity concentrated filament, such as a lamp bulb of the kind commonly used in a motion picture projector or slide projector. Such a lamp bulb has preferably a plurality of coil filaments, as shown in Fig. 4, with the axes of the coils lying in a plane.

Supported in an opening in the partition 41, in alignment with the filament of the bulb 47 and with the cigarette insertion aperture 25, is a lens mount 51 externally threaded at 53 to receive a pair of nuts 55 and 57 which engage on the faces of the partition 41 to hold the lens mount stationarily in place. In the mounting tube 51 is a condenser lens assembly comprising a set or series of lenses of suitable kind, such as a central biconvex lens 61 located between two plano-convex lens elements 63 and 65 held in position by split rings 67 and 69 located in internal grooves of the mount 51. The equivalent focal length of the lens combination is such that an image of the filament or filaments of the bulb will be formed, at substantially unit magnification, on the end of the cigarette placed in the proper lighting position as further described below. The condensing lens system has high light gathering ability (having a relative aperture of preferably about $f:1.0$) thus providing a very high illumination in the image of the lamp filament formed by this lens system on the end of the cigarette. The concentration of the light and consequently the igniting power of the device is increased by a small concave mirror 71 mounted behind the bulb 47 on the optical axis of the lens assembly, the mirror being held by a metal spider 73 at the top of an upstanding bracket 75 secured to the main bracket 43. A sheet 77 (Figs. 3 and 4) of heat insulating material such as asbestos paper, extends around the back of the bulb and mirror assembly and forwardly at both sides thereof, up to the partition 41.

As already indicated, the cigarette aperture 25 is alined with the optical axis of the lens assembly. A guide tube 81 (Figs. 3 and 4) extends inwardly for a short distance from the plate 23, the aperture 25 and the internal diameter of the tube 81 being sufficient to receive easily the external diameter of a cigarette.

Electric current is supplied to the lamp 47 by means of a flexible electric cord 83 equipped with an ordinary plug 85 which may be plugged into any electric receptacle outlet. One of the two conductors in the cord 83 goes direct to one of the connections of the lamp base 45, as at 87, Fig. 4. The other conductor 89 is connected to the other side of the lamp base through a miniature push contact switch 91 of the kind sometimes called a microswitch mounted on the partition 41 and having an upstanding plunger 93 spring biased in an

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upward direction, the switch being normally off and being closed by depressing the plunger 93 against its light spring.

Mounted on and extending forwardly from the partition 41, just above the switch 91, is a bracket 95 comprising two arms spaced laterally from each other, between which arms there is a pivot pin 97 serving as a bearing for a switch operating arm having a rear end 99 which overlies the switch plunger 93 and an upwardly extending end 101 which normally lies just behind and in contact with the rear end of the cigarette guide tube 81. The upper part of this switch operating arm 101 is provided with an opening 103 concentric with the optical axis and of a diameter slightly less than the outside diameter of a standard cigarette shown at 105. Thus when a cigarette is inserted endwise through the guide tube 81, the advancing end of the cigarette will engage the switch operating arm 101 and will not pass through the opening 103 because this opening is too small to permit the cigarette to pass through. The rearward thrust on the cigarette 105 will accordingly displace the switch operating arm 101 rearwardly, from the full line position shown in Fig. 4 to the dotted line position, thereby depressing the switch plunger 93 to close the switch, complete the electric circuit, and light the filament of the bulb 47.

The cigarette 105 is held in the rearward position for a moment, and the light from the bulb is concentrated by the lens assembly onto the end of the cigarette, the lens assembly being designed to concentrate the beam through the opening 103 of the switch operating arm 101 so that the concentrated light reaches the tobacco within the end of the cigarette. In a moment the tobacco reaches ignition temperature, and the user, drawing on the outer end of the cigarette, obtains a light. As the cigarette is withdrawn axially from the opening 25 and guide tube 81, the switch operating arm 101 can move forwardly again and the microswitch 91 opens, cutting off the supply of electric current to the bulb.

To add to the attractiveness of the novelty, observation openings 111 are provided in both side walls 13 and 15, opposite the position occupied by the rear or ignited end of the cigarette when inserted into the lighter. These openings 111 are both covered by transparent plates 113, preferably tinted to avoid any danger of injury to the eyes by stray light of such concentrated form. Nevertheless the observer can look in through the windows 111 to watch the lighting action when a cigarette is thrust into the lighter.

In the structure shown in Fig. 4, it will be noted that the two filaments of the light bulb are oriented in such manner that they are spaced from each other in a direction along the optical axis, rather than in a direction transverse to the optical axis. Therefore the images of these filaments will occupy positions collectively having a substantial dimension in any axial direction or depth direction at the end of the cigarette. This is highly desirable, because then the exact position of the end of the cigarette (in a longitudinal direction along the optical axis) is not critical, but may vary to a reasonable extent and still lie within a sufficiently highly illuminated area to cause ignition of the tobacco. For similar reasons the lamp filaments preferably have substantial diameter (of the coils) and substantial length, so that a large image spot of high intensity illumination covers most or all of the end of the cigarette, insuring ignition even though the cigarette is not exactly centered on the optical axis.

The desired depth dimension (along the optical axis) of the image may be achieved also by mounting the lamp base in a tilted or oblique position relative to the optical axis, so that the axis of the filament will not lie in a plane perpendicular to the optical axis but will be inclined to such plane, at any desired angle up to about 45 degrees. Thus different parts of the filament, being at different distances from the lens system, will be imaged

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in depth on the end of the cigarette, providing greater tolerance in axial positioning of the cigarette when it is to be lighted. The oblique tilting of the filament, or the use of two slightly spaced filaments, or both of these features, thus serve to increase the depth, in an axial or longitudinal direction, of the area in which the temperature will be sufficiently high to ignite the tobacco.

Although an incandescent light bulb has been mentioned above as the preferred source, it will be understood by those skilled in optics that any compact artificial source of radiant energy may be used. Thus for example a concentrated arc may be used, or a glow-bar unit, in place of the incandescent light bulb.

It is seen from the foregoing disclosure that the above mentioned objects of the invention are well fulfilled. It is to be understood that the foregoing disclosure is given by way of illustrative example only, rather than by way of limitation, and that without departing from the invention, the details may be varied within the scope of the appended claims.

What is claimed is:

1. A cigarette lighter comprising a casing having an air inlet opening near its bottom, a heated air outlet near its top, and a cigarette receiving aperture into which a cigarette may be thrust endwise, an electric light bulb within said casing having a filament located approximately on the axis of a cigarette inserted into said aperture, a reflector mounted within said casing on the far side of said bulb from said aperture, a condenser lens mounted in said casing between said bulb and said aperture, in position to concentrate and focus light rays from said filament onto an end of a cigarette inserted into said casing through said aperture, and means operated by insertion of a cigarette into said casing for lighting said filament.

2. A construction as defined in claim 1, in which said means includes a microswitch biased to a normally open position and closed by insertion of a cigarette to a predetermined position in said casing.

3. A construction as defined in claim 2, in which said means further includes a switch operating arm having a portion engaging said microswitch to close it and another portion extending across the path of travel of a cigarette into said casing, to be displaced to a switch closing position by contact with a cigarette inserted into said casing.

4. A construction as defined in claim 3, in which said other portion of said switch operating arm lies across the path of travel of a cigarette being inserted into said casing and has an opening aligned with the axis of said cigarette and of smaller diameter than the cigarette, the concentrated and focused light rays reaching the cigarette through said opening.

5. A construction as defined in claim 1, in which said casing includes two outer walls arranged approximately at a right angle to each other, and in which said aperture is located approximately at a corner between said walls and with the axis of the aperture at an angle to both of said walls.

6. A cigarette lighter comprising an electric light bulb, lens means for concentrating and focusing light from said bulb at a predetermined location, means for guiding a cigarette to a position in which one end thereof will be at said location, and means controlled by movement of a cigarette to said position for lighting said bulb so that the light focused on said end of said cigarette will ignite the same.

7. An optical cigarette lighter comprising means for laterally guiding a cigarette for axial movement to and from a given location, a source of radiant energy, and means including a reflector and a lens for focusing radiant energy from said source onto an end of a cigarette in said location to ignite said cigarette.

8. A construction as defined in claim 7, in which said source of energy comprises an electric light bulb of the projector bulb type having a relatively concentrated fila-

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ment further including a normally open electric switch for controlling flow of electric current to said filament, and a switch operating arm having a portion lying in the path of travel of a cigarette toward said location to be displaced by contact with the cigarette to close the switch.

9. A construction as defined in claim 7 in which said lens includes a plurality of lens components.

10. A construction as defined in claim 7, in which said lens includes two plano-convex lens components and a bi-convex lens component located between and in axial alinement with said plano-convex components.

11. A construction as defined in claim 8, in which said filament has different portions spaced at materially different distances from said lens, so that said lens will image said filament in substantial depth in the approximate location of the end of the cigarette to be lighted.

12. A construction as defined in claim 8, in which said filament has different portions spaced laterally from the optical axis, so that said lens will image said filament over a substantial area of the end of the cigarette to be lighted.

13. A cigarette lighter comprising a compact source of radiant energy, lens means for concentrating and focusing energy from said source at a predetermined location, means for guiding a cigarette to a position in which one end thereof will be at said location, and means controlled by movement of a cigarette to said position for

energizing said source so that the radiant energy focused on said end of said cigarette will ignite the same.

14. An optical cigarette lighter comprising means for guiding a cigarette for axial movement to and from a given location, a source of radiant energy, means including a reflector and a lens for focusing radiant energy from said source onto an end of a cigarette in said location to ignite said cigarette, said source having different portions spaced at materially different distances from said lens, whereby said lens will image said source portions in substantial depth at said location, and means for energizing said source in response to travel of said cigarette toward said location and for deenergizing said source in response to travel away from said location.

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