

[54] **ELECTRIC CIGARETTE LIGHTER**
 [75] Inventor: **Toshio Mase**, Nagoya, Japan
 [73] Assignee: **Kabushiki Kaisha Tokai Rika Denki Seisakusho**
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1,849,795	3/1932	Fenton.....	219/261
2,605,380	7/1952	Bauman et al.....	219/264 X
2,728,844	12/1955	Terney.....	219/266
2,871,335	1/1959	Barnard.....	219/267
3,341,687	9/1967	Horwitt et al.....	219/267
3,462,581	8/1969	Bristol et al.....	219/265 X

Primary Examiner—Volodymyr Y. Mayewsky
 Attorney, Agent, or Firm—Craig and Antonelli

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 219/266, 267

[56] **References Cited**
 UNITED STATES PATENTS
 1,756,013 4/1930 Jackson..... 219/266

[57] **ABSTRACT**
 An electric cigarette lighter with a manually insertable lighter plug having a flexible bellow type cover which expands to the maximum length and contracts to the minimum length in parallel with the longitudinal axis of the electric cigarette lighter when said lighter plug is pulled out of and pressed into a tubular mounting case mounted rigidly, for instance, on the instrument panel of the automotive vehicles.

4 Claims, 3 Drawing Figures

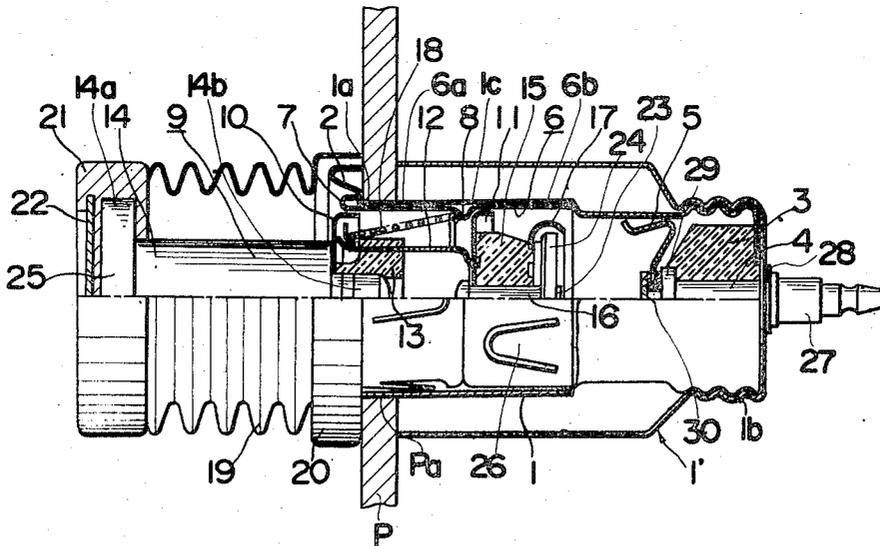


FIG. 1

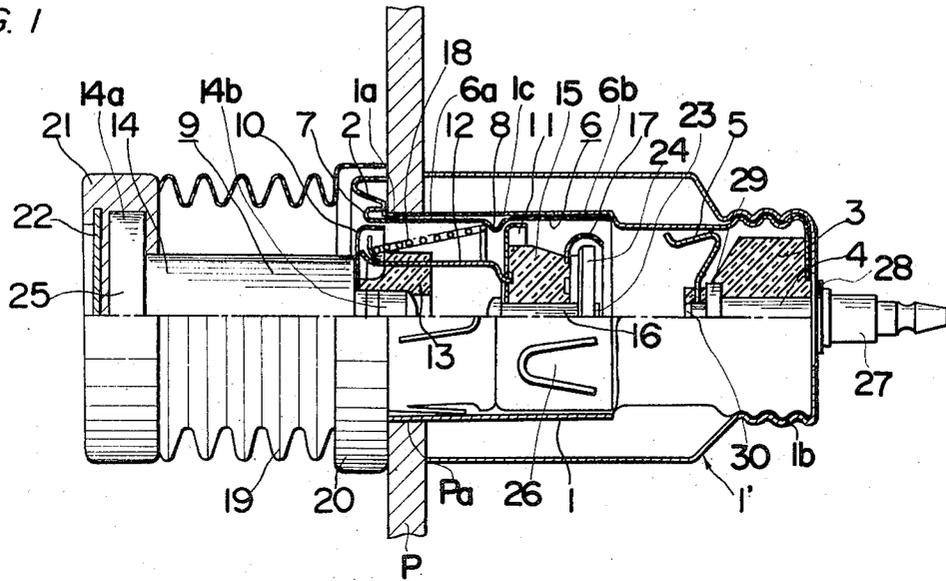


FIG. 2

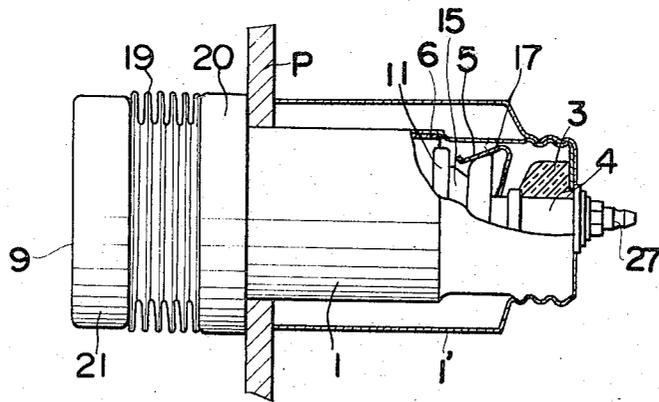
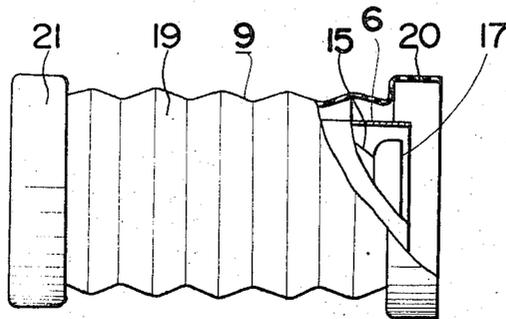


FIG. 3



ELECTRIC CIGARETTE LIGHTER

The present invention relates to an electric cigarette lighter and, more particularly, to an electric cigarette lighter to be used in an automotive vehicle, wherein a mounting case having an electrode inside which is in turn connected to the automobile battery is rigidly mounted on the instrument panel of an automobile. A manually insertable lighter plug with a heating element at its tip is removably supported in the mounting case, and when the lighter plug is further pushed into the mounting case, the projection in the middle of the heating element comes into contact with one end of the electrode having a plurality of radially outwardly arranged bimetallic fingers, thus closing the ignition circuit to heat the heating element. When the heating element reaches the desired temperature, the bimetallic fingers serving as latch means deflect, releasing the heating element automatically, and the lighter plug can be pulled out of the mounting case for lighting cigarettes.

Even in the state where the lighter plug is pushed into the mounting case, a conventional cigarette lighter is still exposed to the atmosphere and therefore, the devices inside the lighter plug are susceptible to humidity, moisture and dust, resulting in damage and malfunctioning of the electric cigarette lighter itself as a whole. On the other hand, when the lighter plug is pulled out of the mounting case for use, the heating element is cooled off very quickly, which is very inconvenient to the user of cigarette lighters.

Accordingly, an object of the present invention is to provide an electric cigarette lighter having a cover to protect the inside mechanisms of the lighter plug from humidity, moisture and dust, thus keeping the electric cigarette lighter always in best and ready-to-use condition.

Another important object of the present invention is to provide an electric cigarette lighter protected against wind and rapid cooling by providing a cover when used out of the automotive vehicle.

A further object of the present invention is to provide an electric cigarette lighter having improved wet-proof, water-proof, and weather-proof properties with substantial elimination of the disadvantages inherent in the conventional electric cigarette lighters.

According to a preferred embodiment of the present invention, the electric cigarette lighter comprises a lighter plug whose outer circumference is surrounded by a cylindrical bellow type cover, which expands and contracts in parallel to the longitudinal axis of said lighter. When it is expanded, it covers from the head of the knob shaft of the lighter plug to the heating element at the tip of the lighter plug. When it is contracted with the lighter plug inserted into the mounting case, it surrounds the opening of the mounting case at the outside of the instrument panel of an automobile. The flexible cylindrical bellow type cover is intended to protect the devices inside the lighter plug.

These and other objects and features of the present invention will be apparent from the following description taken in conjunction with the preferred embodiment thereof with reference to the accompanying drawings, in which:

FIG. 1 is a plan view of the electric cigarette lighter, partly in section, showing one preferred embodiment of the present invention.

FIG. 2 is a similar view with the flexible bellow type cover compressed to the minimum length in parallel to the longitudinal axis, and

FIG. 3 is a plan view, partly in section, showing the lighter plug pulled out of the mounting case with the flexible bellow cover expanded to the maximum length in parallel to the longitudinal axis.

Referring to FIG. 1 the cigarette lighter comprises a tubular metallic mounting case 1 having an open end 1a which removably receives a lighter plug 9. The tubular mounting case 1 has at its open end an annular flange 2 adapted to engage the front face of a vehicle instrument panel P or other support having an opening Pa through which the mounting case 1 is mounted said mounting case 1, being clamped to the panel P by the open extremity of an outer tubular metallic case 1' which is threaded on the rear end 16 of the mounting case 1, extending to the inside of the panel P.

The lighter plug 9 mainly comprises a tubular metallic sleeve 6 having a collar 7 at the outer end, surrounding a contact cup 17 with a coiled heating element 24 disposed therein, an operating knob 14 of the lighter plug 9 with an annular plate 10 which is slidably inserted into the outer end opening 6a of the sleeve 6 having the collar 7, a metallic annular plate 11 inserted slidably into the inner end opening 6b of the sleeve 6 and engaging a radially inwardly extending projection 8 formed in the middle of the sleeve 6, and a drum plate 12 fixed by suitable means to the annular plate 11, projecting outwardly therefrom. The annular plates 10 and 11, and the drum plate 12 are secured to a leg 14b of the operating knob 14 by an insulating connector 13. The compression spring 18 is connected between the projection 8 and the annular plate 10, contacting the annular plate 11 with the projection 8 by the compression force of the spring. The heating element 24 housed in the contact cup 17 is rigidly mounted on the top of an electric conducting rod 16 calked to the center of the annular plate 11 with the contact cup 17 insulated from the rod 16 by means of an insulator 15 and an electrical contacting point 23 of the heating element 24 is provided at the tip of the rod 16. The sleeve 6 of the lighter plug 9 is slidably, removably inserted into the bore 1c defined by the inner cylindrical surface of the mounting case 1 to such an extent that the collar 7 of the sleeve 6 contacts the open end of the case 1 and frictionally held therein by a plurality of radially inwardly extending punched spring tongues 26.

A current inlet supply post 27 to be connected to the positive terminal of a vehicle battery is rigidly secured by any suitable means at the rear ends of the mounting case 1 and the outer tubular case 1' insulated therefrom by means of an insulating material 3 and an insulating washer 28. An electrical contact point 30 is provided at the tip of the post 27. A plurality of U-shaped bimetallic fingers 5 are fixedly connected to the inner end of the post 27 at a riveted head 29. The bimetallic fingers 5 serve as a latch means together with the contact cup 17 mounted at the tip of the lighter plug 9 when the lighter plug 9 is further pushed into an energizing position from the illustrated idle position shown in FIG. 1, causing the contact points 23 and 30 to contact each other as shown in FIG. 2 completing an ignition circuit for the lighter. To be more in detail, the annular plates 10 and 11 slidably move inside of the sleeve 6 held in the mounting case 1 against the compression force of the spring 18, by pushing the lighter

plug 9 forward, consequently the cup pushed forward engaging the finger 5.

In the idle position of the lighter shown in FIG. 1, the sleeve 6 is held to the case 1 by the spring tongues 26 and the collar 7 engages the outer edge of the opening 1a of the mounting case 1. When the lighter plug 9 is pushed further inwardly into the sleeve 6 against the force of the spring 18, the circumference of the contact cup 17 latchingly engages the bimetallic fingers 5 with the contacts 23 and 30 contacting each other, establishing an ignition circuit from current through the inlet post 27, the heating element 24, the conduction rod 16, the case 1 and the ground (not shown). When the heating element 24 reaches a predetermined temperature, the bimetallic fingers 5 deflect outwardly away from the longitudinal axis of the case 1, thus disengaging the latched means to permit the spring 18 to project the plug 9 outwardly for removal for lighting cigarettes. The lighter plug 9 further comprises a flexible cylindrical bellow type cover 19 which covers the operating knob 14 and the sleeve 6 in the fully expanded condition as shown in FIG. 3. The flexible bellow type cover 19 expansible and contractible in parallel with the longitudinal axis of the lighter plug 9 has a cylindrical portion 20 of a short length at the front end thereof which contacts the outer surface of the instrument panel P, covering the outer circumference of the annular flange 2 at one end of said mounting case 1. The rear end of said cover 19 is connected to a mounting ring 21 which is in turn connected and mounted on the head 14a of the operating knob 14, and an indicating plate 22 which may be imprinted with a symbol representing the cigarette lighter, is attached to the front face of said mounting ring 21.

The flexible cover 19 is made of a material, for example, rubber, so designed as to make airtight and to move the cylindrical portion 20 in parallel with the longitudinal axis of the lighter plug 9, so that in the state of expansion, the cylindrical portion 20 surrounds the cup 17 near the outer end of the sleeve 6. The cover 19 easily contacts the cylindrical portion 20 in parallel with the longitudinal axis of the lighter plug 9 by pushing the mounting ring 21 by the light force so as to establish an engagement between the cup 17 and the fingers 5. The cylindrical portion 20 is formed as to contact the front surface of the panel P to seal the space therebetween.

The lighter plug 9 is normally in the state shown in FIG. 1 where the sleeve 6 is inserted in the mounting case 1, but the cup 17 does not engage the FIG. 5.

FIG. 1 shows an idle condition where the lighter plug 9 is mounted into the mounting case 1, in which state the bellow type cover 19 is slightly compressed with the front edge of said cylindrical portion 20 contacting the outer face of the instrument panel P around the opening Pa of the mounting case 1, said bellow type cover 19 covering said opening and forwardly projecting part of the plug 9, thus preventing the entrance of humidity, moisture and dust into the mounting case 1. Similarly when the lighter plug 9 is further pushed into the mounting case 1 to ignite the heating element 24, the bellow type cover 19 is further compressed to the minimum length in parallel with the longitudinal axis of the lighter plug 9 with the smallest pitch of bellows as shown in FIG. 2, the inside mechanisms is also well protected from the atmosphere.

When the heating element 24 is heated to the predetermined temperature the engagement between the cup 17 and the fingers 5 is released by the spring 18 and the lighter plug 9 returns from the position of FIG. 2 to the position in FIG. 1. Furthermore, in the condition where the lighter plug 9 is pulled out of the mounting case 1 for cigarette lighting purpose upon completion of heating the heating element 24 as shown in FIG. 3, the below type cover 19 expands in parallel with the longitudinal axis to the maximum length with the largest bellow pitch and roughly straight inner surface, surrounding from the outer circumference of the heating element 24 through to the head 14a of the operating knob 14, thus acting as a windshield to prevent the rapid cooling of the heating element 24, which is especially effective when the lighter plug 9 is taken out of the vehicle for outdoor use.

After the lighter plug 9 pulled out of the mounting case 1 has been used for the cigarette lighting purpose, the driver of the automotive vehicle puts it back in the position as shown in FIG. 1.

As is clear from the above description, though in the conventional cigarette lighter, the lighter plug both in the idle and inserted states exposed to the atmosphere, is susceptible to humidity, moisture and dust, sometimes resulting in malfunctioning of the cigarettes lighter itself while in the state where the lighter plug is removed from the case for use, the heating element tends to cool rapidly, the cigarette lighter of the present invention can preclude such defects by providing the cylindrical bellow type cover 19 with simple construction as shown in FIGS. 1, 2 and 3.

Although the present invention has been fully described by way of example with reference to the attached drawings, it is to be noted that various changes and modifications are apparent to those skilled in the art. For example, the flexible bellow type cover may be replaced by other suitable flexible covering. Therefore, unless otherwise such changes and modifications depart from the scope of the present invention, they should be construed as included therein.

What is claimed is:

1. An electric cigarette lighter which comprises a lighter plug including an operating knob with a mounting ring at one end and a resistance heating element insulatively mounted on the other end, a thermostatic latching means which holds said heating element to receive an electric current from an electrically insulated supply post provided in a mounting case, and a flexible, cylindrical insulating cover with one end mounted on the mounting ring, said cover expanding and contacting in parallel with the axis of the operating knob, and said mounting case being attached to a panel and having said supply post, said cover covering the portion between said mounting ring and the front surface of said panel when said heating element is inserted into the mounting case, and surrounding said heating element when said lighter plug is pulled out of the mounting case.

2. An electric cigarette lighter as claimed in claim 1, wherein said cylindrical cover is of bellow type.

3. An electric cigarette lighter as claimed in claim 2, wherein said bellow type cover is formed with rubber material.

4. An electric cigarette lighter as claimed in claim 2, wherein said bellow type cover is provided with a cylindrical portion at free end thereof, the edge of said cylindrical portion attaching to the front surface of said panel when said heating element is inserted into the mounting case.