United States Patent

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[54] **CIGARETTE LIGHTER FOR DOMESTIC APPLIANCES**
5 Claims, 9 Drawing Figs.

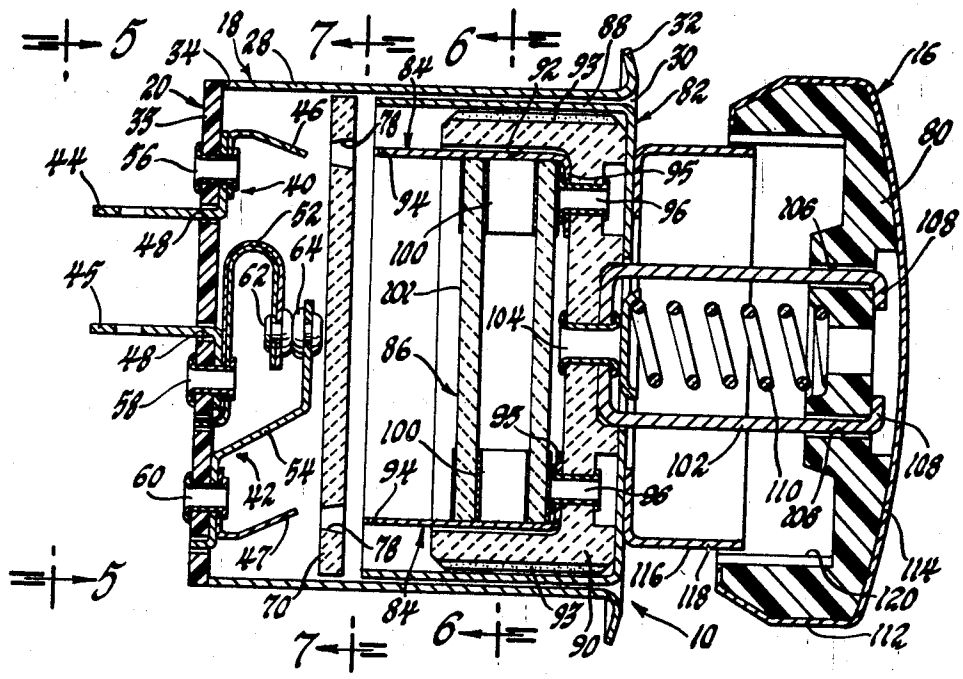
[52] **U.S. Cl.** **219/265,** 219/267, 219/512
[51] **Int. Cl.** **F23g 7/14**
[50] **Field of Search** ..... 219/263-—5, 270, 267, 512, 262, 260

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ABSTRACT: A cigarette lighter for use in a domestic appliance includes a receptacle having a contact assembly mounted at one end and an igniting plug slidably received in the other end, the igniting plug including a hollow rectangular heating element which is electrically connected to a pair of downwardly projecting contacts. A ceramic shield disposed within the receptacle isolates the contact assembly from manual contact and includes apertures through which the terminals extend into engagement with the contact assembly for energizing the heating element. The contact assembly further includes a bimetal thermostat that is responsive to radiant energy and operative to open the igniting circuit to the heating element under predetermined operating conditions as sensed through slots formed in the insulating shield.



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SHEET 1 OF 2

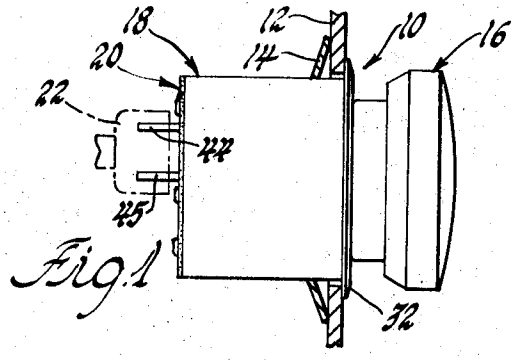


Fig. 1

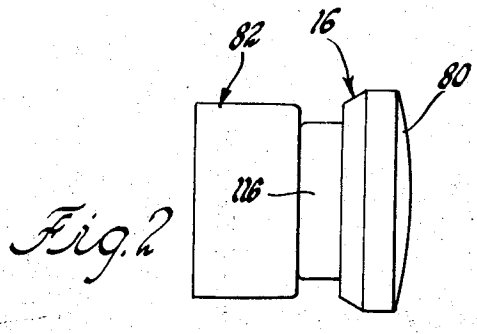


Fig. 2

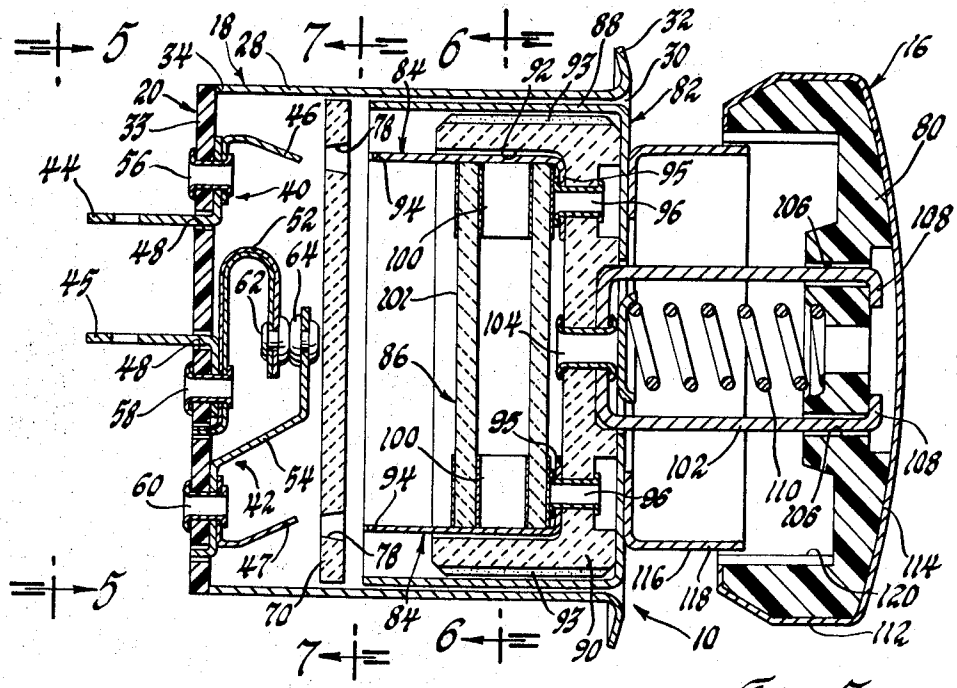


Fig. 3

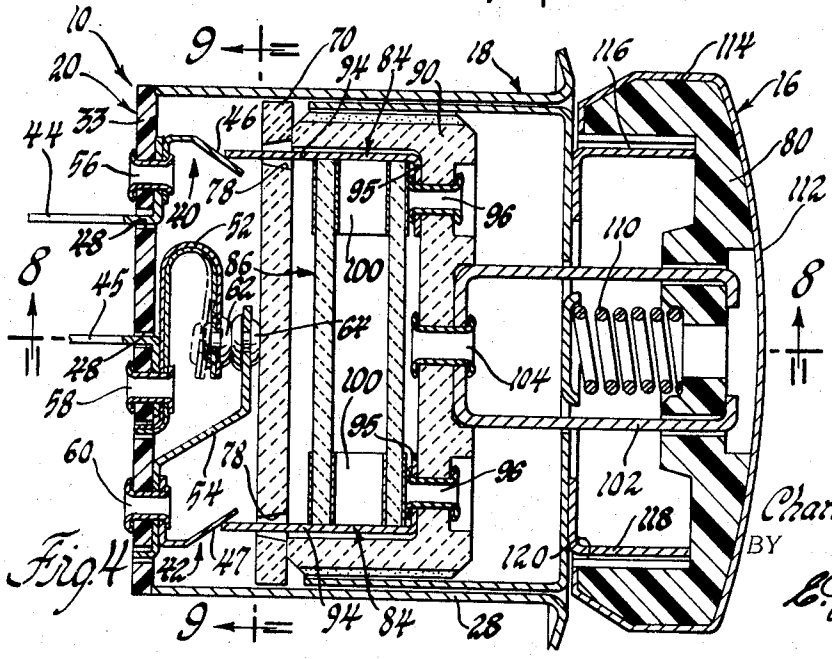


Fig. 4

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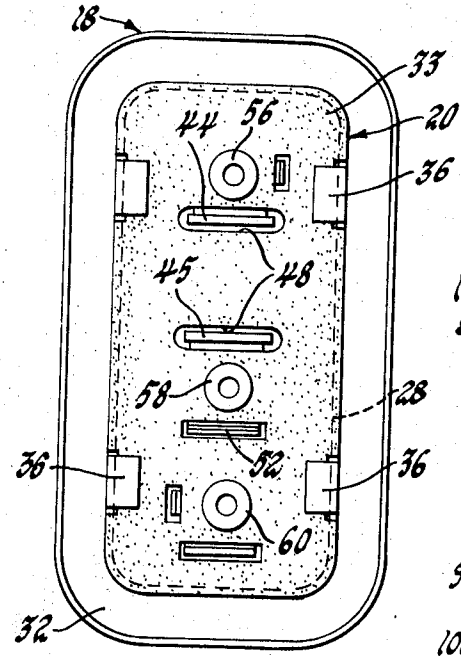


Fig. 5

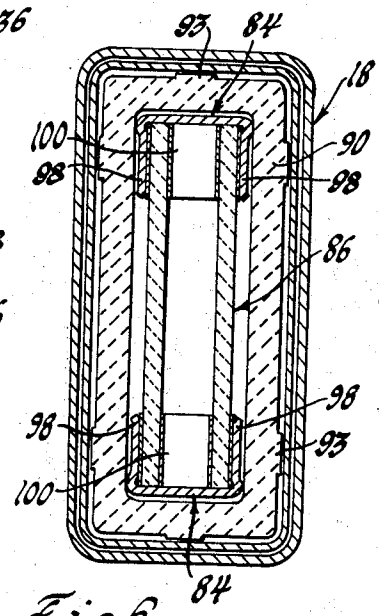


Fig. 6

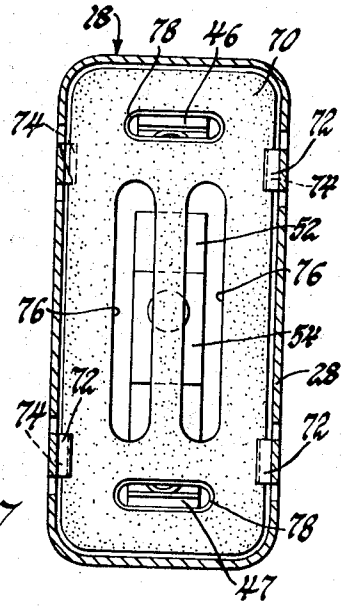


Fig. 7

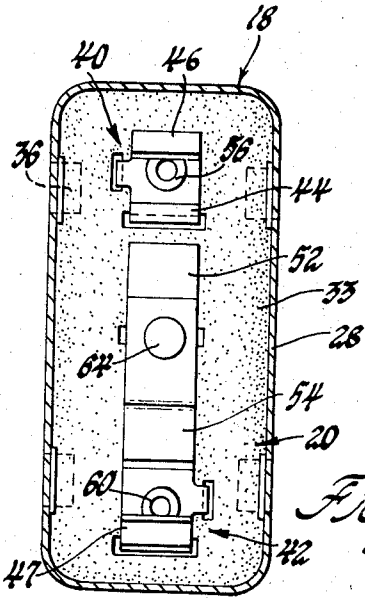


Fig. 9

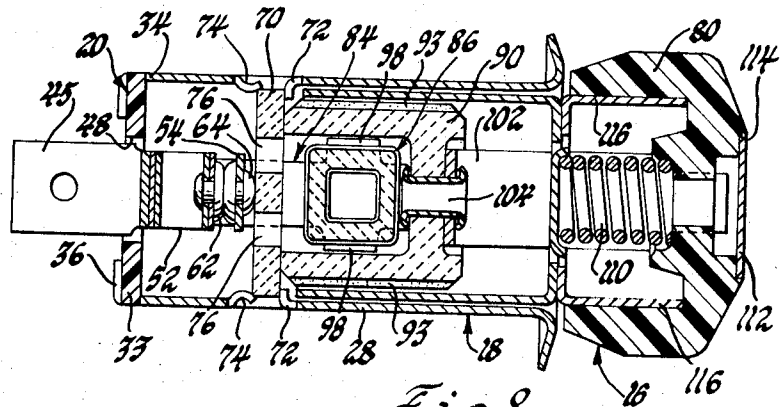


Fig. 8

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CIGARETTE LIGHTER FOR DOMESTIC APPLIANCES

Previously, cigarette lighters operable at high voltages such as used in household circuits have generally taken the form of a motor vehicle cigarette lighter. Normally, these lighters include voltage-dropping means such as resistors or transformers for reducing the line voltage to that normally found in a motor vehicle. This arrangement is not entirely satisfactory inasmuch as the additional parts greatly add to the cost and size of such an assembly. Other installations have proposed directly electrically connecting the heating element of the lighter assembly to the high voltage circuit. However, the heating elements generally employed were not compatible with the high voltage and, after a period of time, failure would occur through burnout or element deterioration.

The present invention has as its objective a new and improved cigarette lighter which is directly connectable into a high voltage circuit so as to eliminate the need for transformers or voltage-dropping resistors thereby reducing the cost and complexity of such an article. The present invention also contemplates a heating element which is independently capable of operably handling high voltages without experiencing burnout or deterioration, is capable of reaching an operating temperature rapidly, and has a large and easily accessible igniting surface. Moreover, the present invention provides a lighter design which is electrically and thermally safe so as meet the operating standards of the various agencies which approve and regulate domestic electrical appliances.

These objectives are generally accomplished in the present invention by providing a mounting case or receptacle that carries a contact assembly at its rearward end which is directly connected to a high voltage source. The other end of the receptacle is open for slidable receipt of an igniting plug having a hollow rectangular ceramic heating element. This form of heating element is capable of directly withstanding high voltages without burnout or deterioration and provides a large rectangular igniting surface which is easily accessible to the user. The contact assembly includes a pair of terminals, one of which includes a bimetal thermostat that senses the radiant energy of the heating element so as to interrupt the lighter igniting circuit under predetermined operating conditions and thereby prevent excessive overheating of the lighter. The contact assembly is physically isolated from manual contact by a ceramic insulating shield disposed within the receptacle. The shield includes viewing windows in the form of elongated slots which visibly connect the heating element with the thermostat so that the radiant energy of the latter may be directly sensed. The contacts of the igniting plug project through slots in the shield into contact with the contact assembly for completing an igniting circuit to the heating element. By this construction, when the igniting plug is shifted to an energizing position, the heating element rapidly rises to an operating temperature at which time the igniting plug is removable from the receptacle for use. When the igniting is removed, the shield serves to physically isolate the contact assembly from manual contact. In the event the igniting plug is held in the energized position for too long a time, the thermostat senses the radiant energy emitted from the heating element through the viewing windows and interrupts the igniting circuit after a predetermined time.

These and other objects will be apparent to one skilled in the art upon reading the following detailed description, reference being made to the accompanying drawings in which:

FIG. 1 is a side elevational view of a cigarette lighter made in accordance with the present invention;

FIG. 2 is a side elevational view of the igniting plug shown in FIG. 1;

FIG. 3 is an enlarged side cross-sectional view showing the cigarette lighter of FIG. 1 in the idle position;

FIG. 4 is a view similar to FIG. 3 showing the cigarette lighter in the energizing position;

FIG. 5 is a view taken along line 5–5 of FIG. 3;

FIG. 6 is a view taken along line 6–6 of FIG. 3;

FIG. 7 is a view taken along line 7–7 of FIG. 3;

FIG. 8 is a view taken along line 8–8 of FIG. 4; and

FIG. 9 is a view taken along line 9–9 of FIG. 4.

Referring to FIG. 1, there is shown a cigarette lighter 10 made in accordance with the present invention which is mounted on a panel 12 of a domestic appliance by means of a retaining clip 14. The lighter 10 generally comprises an igniting plug 16 and a holder or receptacle 18 including a contact assembly 20. A connector 22 is snapped onto the contact assembly 20 for electrically connecting the lighter 10 to a high voltage circuit, such as the 120 volts commonly used in household circuits.

Referring to FIG. 3, the receptacle 18 is formed of sheet metal and generally includes a tubular rectangular sleeve 28 having an open end 30 terminating with an outwardly turned flange 32 which engages the aforementioned panel 12. As additionally shown in FIG. 5, the contact assembly 20 includes a mounting plate 33 formed of an insulating material that is secured to the rear end 34 of the receptacle 18 by a plurality of inwardly bent tabs 36.

The contact assembly 20 generally comprises a pair of current inlet terminals 40, 42, each of which respectively includes L-shaped connectors 44, 45 and spring contacts 46, 47. The connectors 44, 45 have spade-type electrical ends projecting outwardly through slots 48 formed in the mounting plate 33. The terminal 42 further includes a generally U-shaped thermostat 52 and a contact holder 54. The contact 46 and the connector 44 are mechanically fastened to the mounting plate 33 by a riveted eyelet 56. The connector 45 and the thermostat 52 are mechanically fastened to the mounting plate 33 by a riveted eyelet 58. The contact 47 and the contact holder 54 are mechanically fastened to the mounting plate 33 by a riveted eyelet 60. The upper ends of the contact holder 54 and the thermostat 52 are provided with contact points 62 and 64 which, under ambient conditions and within a predetermined temperature range, are in the illustrated closed position.

The thermostat 52 is of a conventional bimetallic construction. As shown in broken lines in FIG. 4, the thermostat 52 is adapted to flex inwardly upon radiant heating such that the contact points 62 and 64 separate under predetermined operating conditions to be described below.

Referring to FIGS. 7 and 8, an insulating shield 70 formed of a thermally and electrically insulating material such as porcelain is disposed within the receptacle 18 at the front of the contact assembly 20. The receptacle 18 includes a plurality of inwardly bent tabs 72 which engage the front surface of the shield 70 and a plurality of inwardly staked projections 74 which engage the rear surface of the shield 70. The tabs 72 and projections 74 thereby serve to fixedly mount the shield 70 in the receptacle 18 such that the shield 70 serves to physically isolate the contact assembly 20 against manual contact from the open end 30 and the lighter 10. The shield 70 includes a pair of centrally located longitudinal viewing slots or windows 76 which visibly register with the thermostat 52 and a pair of tapered lateral slots 78 which register with the contacts 46, 47.

The igniting plug 16 generally comprises an operating knob 80, a guide cap 82, a pair of clip contacts 84 and a heating element 86. The guide cap 82 is generally cup-shaped and has a rectangular outer sleeve 88 which is slidably disposed within the open end 30 of the receptacle 18. A generally rectangular retainer 90 formed of a ceramic material is disposed within the guide cap 82 and includes a central recess 92 in which the contacts 84 and the heating element 86 are retained. As shown in FIGS. 3 and 8, the retainer 90 is spaced from the sleeve 88 by a plurality of vertical ribs 93 which serve to reduce conductive heat transfer between the heating element 86 and the sleeve 88. The contacts 84 include outwardly projecting legs 94 which register with the slots 78 and inwardly bent arms 95 that are fixedly connected to the retainer 90 by riveted eyelets 96. The contacts 84, as shown in FIG. 6, include inwardly bent arms 98 that frictionally grip the outer surface of the heating element 86 and electrically connect the latter to the contacts 84.

The heating element 86 is in the form of a hollow rectangular bar formed as an extruded square tube of a silicone conducting material in a ceramic matrix. The ends of the heating

element are covered with a metallic coating **100** for providing improved electrical contact with the arms **98** and the legs **94** of each contact **84**. The hollow shape of the heating element **86** permits rapid energization to an incandescent igniting temperature. The rectangular rear surface **101** of the heating element **86** provides a large and easily accessible igniting surface for the user.

A generally U-shaped bracket **102** is fixedly connected to the upper surface of the retainer **90** by a riveted eyelet **104**. The upper ends of the bracket **102** extend through slots **106** formed in the knob **80** and include reversely inwardly bent tabs **108** that serve to retain the knob **80** on the bracket **102**. A coiled spring **110** compressively retained between the top surface of the guide cap **82** and the lower surface of the knob **80** serves to bias the knob **80** upwardly. A decorative band **112** retained in a longitudinal groove **114** formed in the knob **80** serves to provide a decorative surface on the knob as well as covering the tabs **108** of the bracket **102**. A generally cup-shaped member **116** is spot welded to the front surface of the guide cap **82** and includes a sleeve **118** which is relatively slidable with respect to the inwardly facing surface of a recess **120** formed in the knob **80** for telescopically guiding the latter.

To energize the lighter **10**, the knob **80** is pushed inwardly from the idle position shown in FIG. **3** to the energizing position shown in FIG. **4** thereby compressing the spring **110** and downwardly shifting the retainer **90**, the heating element **86** and contacts **84**. The ends of the legs **94** extend through the slots **78** and yieldingly engage and inwardly deflect the contacts **46, 47**. At this point, an igniting circuit is established as follows: connector **44**-contact **46**-contact **84**-heating element **86**-contact **84**-contact **47**-contact holder **54**-thermostat **52**-connector **45**. When the igniting circuit is energized, the heating element **86** will quickly rise in temperature and increasingly emit radiant energy. In the present design, it is contemplated to have the heating element reach an incandescent operating temperature of 1500° F. in approximately 3 to 5 seconds at which time the igniting plug **16** is removable from the receptacle **18** for normal use. However, if the heating element **86** remains energized for too long a period, the latter radiates heat through the viewing windows **76** to the thermostat **52** which, in this preferred embodiment, is designed to rearwardly deflect and open the contact points **62** and **64** after the igniting circuit has been energized for approximately 10 to 15 seconds thereby allowing the element **86** to cool. By use of the principle of sensing the radiant energy of the heating element **86**, it is possible to physically electrically isolate the contact assembly **20** and the thermostat **52** from the open end **30** of the lighter.

Although only one form of this invention has been shown and described, other forms will be readily apparent to those skilled in the art. Therefore, it is not intended to limit the scope of this invention by the embodiment selected for the purpose of this disclosure but only by the claims which follow.

I claim:

1. A cigarette lighter comprising: a holding device; current inlet means carried at one end of said holding device and adapted to be connected to a source of electrical current; thermostat means responsive to radiant energy and operative to interrupt the flow of electrical current in the lighter under predetermined operating conditions; an igniting unit including an electrical heating element slidably received in the other end of said holding device and movable therewithin between an idle and an energizing position; contact means connected to the heating element and engageable with the inlet means in said energizing position for completing an igniting circuit between the source of current and the heating element whereupon the latter rises in temperature and increasingly emits radiant energy; a shielding member disposed within said holding device between the ends thereof which physically isolates said inlet means from said other end; aperture means in said shielding member for exposing the thermostat means to the heating element such that the former can directly sense the radiant energy of the latter and thereby open said igniting circuit under said predetermined operating conditions.

2. A cigarette lighter comprising: a holding device; current inlet members carried at one end of said holding device and electrically insulated therefrom, said inlet members including connector ends projecting outwardly of said holding device adapted to be electrically connected to a source of electrical current and contact ends located within said holding device; a thermostat in one of said inlet members which is responsive to radiant energy and operative to interrupt the flow of electrical current in the lighter under predetermined operating conditions; an igniting unit slidably received in the other end of said holding device and movable therewithin between a normal idle and an energizing position; spring means biasing the heating element to the idle position; an electrical heating element carried by the igniting unit and insulated from said holding device; contacts connected to the heating element and engageable with said contact ends in said energizing position for completing an igniting circuit to the heating element whereupon the latter rises in temperature and increasingly emits radiant energy; a nonconductive shielding member disposed within said holding device between the ends thereof which physically isolates said inlet members and said thermostat from said other end; apertures in said shielding member through which said contacts extend in said energizing position and which expose the thermostat to the heating element such that the former can directly sense the radiant energy of the latter and thereby open said igniting circuit under said predetermined operating conditions.

3. A cigarette lighter for use with a source of electrical current of relatively high voltage comprising: a tubular receptacle adapted to be mounted on a support member; an igniting plug slidably received in one end of the receptacle and movable therewithin between an idle position and an energizing position; an elongated barlike electrical heating element carried by the igniting plug and electrically insulated from the receptacle; contacts electrically connected to the ends of said heating element and projecting toward the other end of said receptacle; a shield formed of a nonconductive material mounted in said receptacle and having slots formed therein registering with said contacts and through which said contacts project when said igniting plug is in the energizing position; a contact assembly carried at the other end of said receptacle and electrically insulated therefrom, said contact assembly including a pair of inlet terminals having ends projecting outwardly of said receptacle for electrical connection with said source of current and having contact ends located within said receptacle which yieldingly engage said contacts electrically connected to the ends of said heating element in said energizing position to complete an igniting circuit between the source of current and the heating element so as to energize the latter to an igniting temperature; and a thermostat in said contact assembly for interrupting said igniting circuit under predetermined operating conditions to thereby prevent overheating of the lighter.

4. A cigarette lighter for a domestic appliance comprising: a tubular receptacle adapted to be mounted on the domestic appliance; a mounting plate formed of an insulating material mounted at one end of the receptacle; a pair of terminals carried on said mounting plate and having first end portions projecting outwardly of the receptacle which are adapted to be connected to a source of electrical current of relatively high voltage and second end portions projecting inwardly of said receptacle, one of said terminals including a thermostat operative to interrupt the flow of electrical current in the lighter under predetermined operating conditions; an igniting plug slidably received in the other end of the receptacle and movable therewithin; a hollow rectangular electrical heating element formed of a conductive ceramic material carried by the igniting plug; a pair of contacts electrically connected to the ends of the heating element having end portions projecting toward said terminals which yieldingly engage said second end portions in an energizing position for completing an igniting circuit to said heating element whereupon the latter rises to an

incandescent igniting temperature; and a shielding member mounted within said receptacle and having slots through which said end portions of said contacts project into engagement with said terminals in said energizing position, said shielding member serving to physically isolate said terminals for manual contact from the open end of said receptacle.

5. A cigarette lighter for use on a domestic appliance operated by a source of electrical current of relatively high voltage comprising: a generally rectangular tubular receptacle adapted to be mounted on said domestic appliance; a pair of electrical terminals mounted at one end of the receptacle and having outwardly projecting connectors adapted to be connected to the source of current and inwardly projecting contacts, one of which includes a bimetallic thermostat responsive to radiant energy and operative to interrupt the flow of electrical current in the lighter under predetermined operating conditions; a shield formed of a nonconductive material mounted within said receptacle between said contacts and the other end of said receptacle, said shield including first apertures which register with said contacts and second apertures which register

with said thermostat; an igniting plug received within the other end of the receptacle, said igniting plug being movable therewithin between an idle and an energizing position; spring means biasing the igniting plug to the idle position; an electrical heating element in the form of an extruded square tube formed of an electrically conductive ceramic material mounted on the igniting plug; an electrically conductive coating on the ends of the heating element; a pair of contacts mounted on the igniting plug and having first ends electrically connected with said coatings and second end portions adapted to extend through said first apertures into yielding engagement with said contacts in said energizing position for completing an electrical circuit between said source of current and said heating element, said heating element thereupon rapidly rising to an incandescent igniting temperature and said thermostat directly sensing the radiant energy of the heating element through said second apertures for opening said igniting circuit under said predetermined operating conditions.