Nov. 3, 1942. H. G. LEHMANN 2,301,129

CIGAR LIGHTER

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Fig. 1

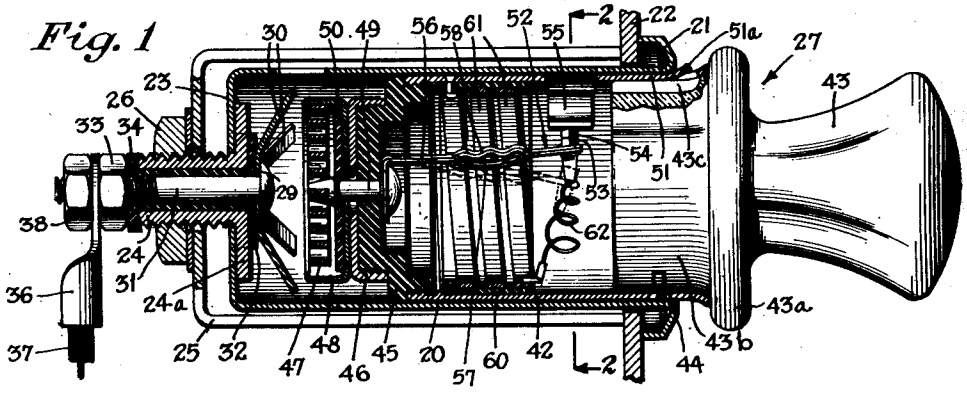


Fig. 2

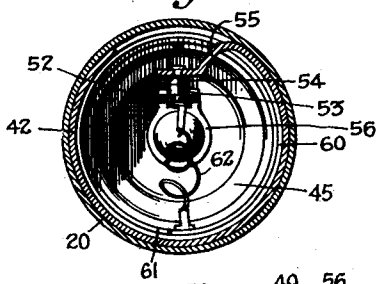


Fig. 4

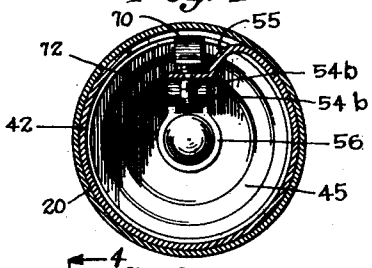


Fig. 3

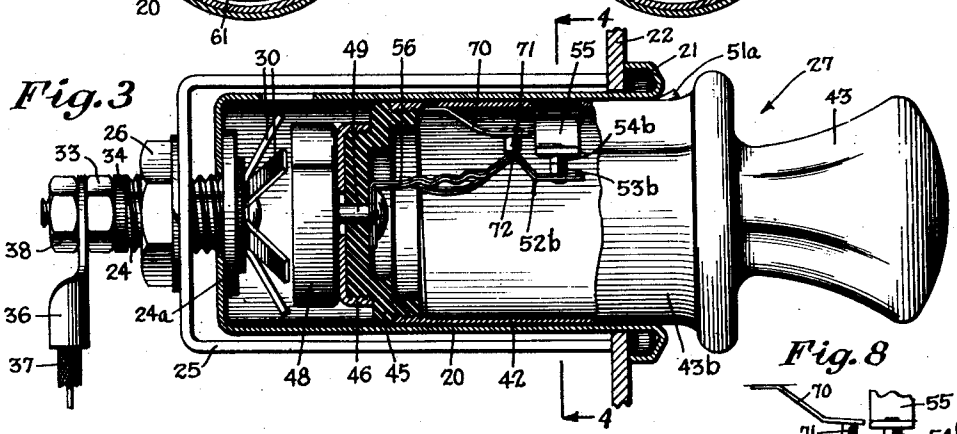


Fig. 8

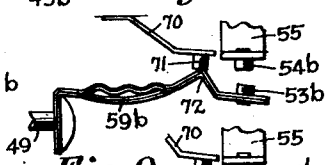


Fig. 5

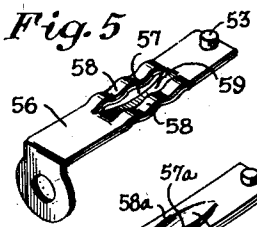


Fig. 7

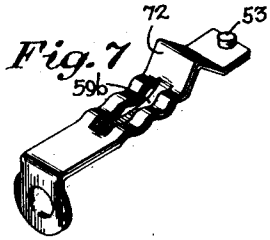


Fig. 9

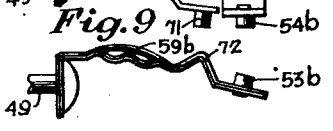
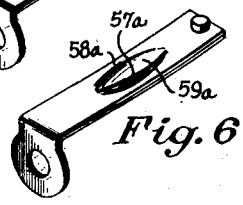


Fig. 6



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CIGAR LIGHTER

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Fig. 10

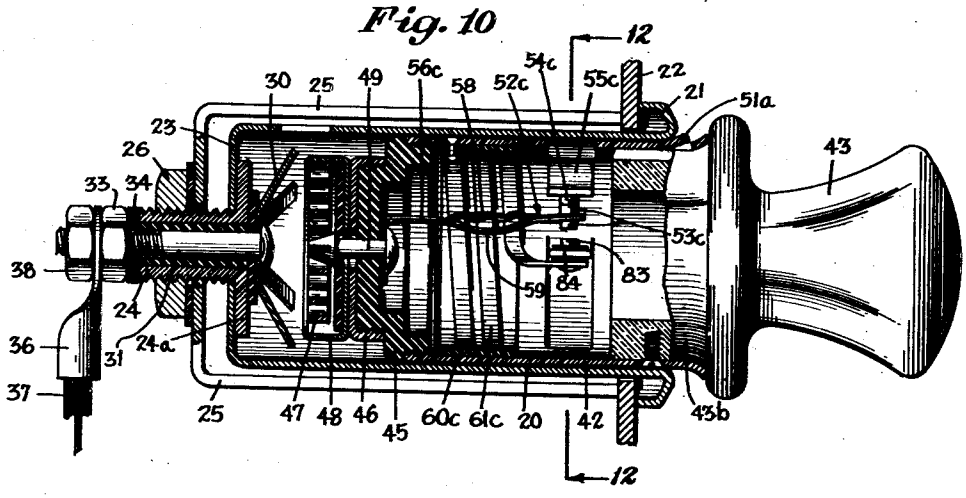


Fig. 11

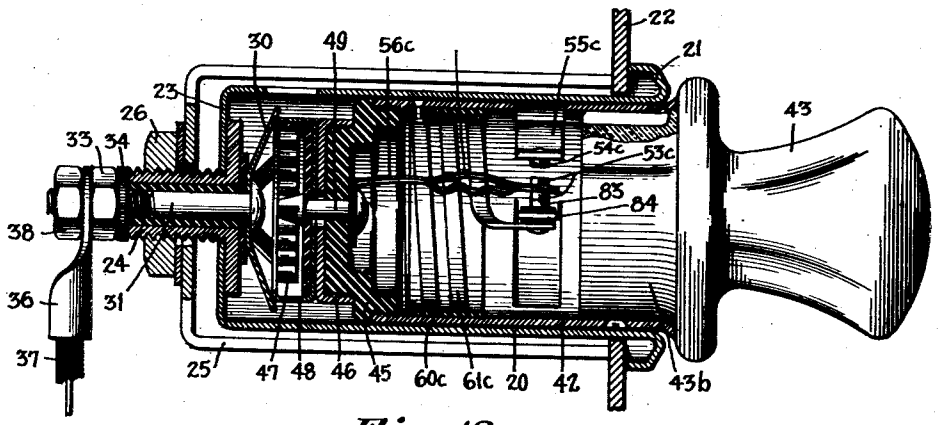
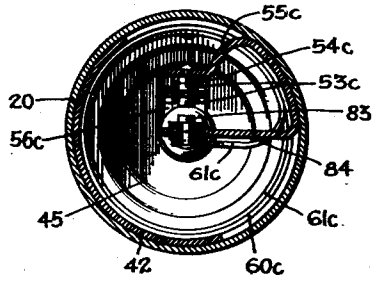


Fig. 12



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Patented Nov. 3, 1942

2,301,129

UNITED STATES PATENT OFFICE

2,301,129

CIGAR LIGHTER

Herbert G. Lehmann, Wood-Ridge, N. J., assignor to Automatic Devices Corporation, Bridgeport, Conn., a corporation of Connecticut

Application July 2, 1938, Serial No. 217,143

5 Claims. (Cl. 219—32)

The present invention relates to cigar lighters, and, more particularly, to the type in which the circuit to the heating element is automatically opened when the heating element reaches a predetermined desired heat.

It is an object of the present invention to provide a cigar lighter in which the circuit to the heating element includes a snap-acting means which quickly opens the circuit to the heating element.

Preferably, the cigar lighter of the present invention is of the type in which the heating coil is quickly brought up to the desired heat and the snap-acting means is made responsive to the heating up of the heating coil so that the circuit will be opened as soon as the heating coil reaches its predetermined desired heat.

In order to bring the heating element quickly to the desired heat, it is subjected to a very high current. This current is passed through a heat-responsive conductor forming a part of the snap-acting means mounted on the igniting unit and having a movable contact thereon cooperating with a fixed contact on the igniting unit. The heat-responsive conductor is so constructed that it is heated at the same rate as the heating element by the current passing therethrough and upon reaching a predetermined heat snaps out of closed-circuit position.

In the preferred form of the invention, the heat conductor forming the snap-acting means for moving the movable contact is made of bimetallic material. To cause the conductor to operate quickly, a portion of the conductor is buckled so that it will lie on either side of the plane of the conductor and tends to hold the conductor in either of two positions, depending upon the side from which it projects. Upon being heated, the buckled portion will become stressed so that it tends to shift to the other side of the conductor and will quickly snap the contact into open-circuit position.

With a high current passing through the contacts, provision must be made to either prevent arcing at the contacts, which would normally pit and burn out the contacts if made of the usual contact material, or the contacts must be made of such material that they will not be affected by the arcing.

Arcing is prevented in one form of the invention by connecting a resistance across the contacts so that when the contacts move into open-circuit position the circuit will not be broken but will include the resistance in series with the heating element.

In this form of the invention, the resistance, which is inserted in series with the heating element, will be of such value that the current in the circuit will be reduced to that sufficient to maintain the heating element at a usable temperature. This current also is sufficient to maintain the heat-responsive conductor in open-circuit position.

In another form of the invention, the igniting unit is provided with an auxiliary switch which is adapted to have a carbon contact in engagement with a portion of the conductor arm and maintain the circuit closed until the contacts normally carrying the current are opened. The heat-responsive conductor in this form of the invention is so constructed that, upon the heating element being heated to the desired heat, it quickly snaps into open-circuit position. In moving to this position, the contacts normally carrying the current are first opened and then the conductor moves out of contact with the carbon contact.

In another form of the invention, the snap-acting switch moves between two positions, and, in each position, closes a circuit to the heating element. In its normal position, that is the position when the heat-responsive conductor is cold, it will connect the heating element directly to the ground contact on the igniting unit. When the circuit is completed, the heating element will quickly be brought up to the desired heat and the heat-responsive conductor will snap into its other position in which the heating element will be connected through a resistance to ground, which will reduce the current passing through the heating element to that value which will maintain the heating element at a usable heat.

In the broader aspects, the invention contemplates the use of a snap-acting and heat-responsive switch mounted in the igniting unit and adapted to control the operation of the heating element. With the heat-responsive switch formed on and completely carried by the igniting unit, it will always properly control the circuit to the heating element without regard to the particular holder in which the igniting unit is disposed.

Other features and advantages of the invention will be apparent from the specification and claims when considered in connection with the drawings, in which:

Figure 1 is a longitudinal sectional view of the holder with the igniting unit therein partially in section.

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1.

Fig. 3 is a sectional view similar to Fig. 1 showing a modified form of the switch construction on the igniting unit.

Fig. 4 is a sectional view taken along line 4—4 of Fig. 3.

Fig. 5 is a perspective view of the switch element shown in Fig. 1.

Fig. 6 is a perspective view of a modified form of the switch element shown in Fig. 5.

Fig. 7 is a perspective view of the switch shown in Fig. 3.

Figs. 8 and 9 show a diagrammatic view of the contacts shown in Fig. 3, showing the snap-acting switch moving to open-circuit position; Fig. 8 showing one pair of contacts open and the other closed, and Fig. 9 showing both pairs of contacts open.

Fig. 10 shows a longitudinal sectional view of the holder with a modified form of igniting unit mounted therein partly in section showing the snap-acting switch in closed-circuit position.

Fig. 11 is a view similar to Fig. 10 showing the switch connecting the heating element to the resistance.

Fig. 12 is a sectional view taken along line 12—12 of Fig. 10.

The cigar lighter of the present invention includes a tubular sheet metal holder **20** having its forward end rolled outwardly to form a flange **21** adapted to engage the face of a suitable support as, for example, a dashboard **22** of an automobile when the holder is positioned in an opening therein. The other end of the tubular sleeve is provided with a transverse end wall **23** having a central aperture in which is secured a bushing **24**. The bushing has a projecting flange **24***a* at one end thereof adapted to extend over and engage the inner surface of the end wall.

The tubular holder is locked in engagement with the dashboard of the automobile and grounded thereto by a U-shaped locking member **25** extending along the tubular member with the bow of the U spaced from the end wall and provided with a central aperture slidable over the bushing **24**. The locking member is moved into clamping relation with the dashboard by means of a nut **26** threaded on the projecting end of the bushing **24**. An igniting unit, generally indicated at **27**, is adapted to be positioned within the holder to be energized.

In order to form an energizing circuit for the igniting unit, the tubular holder has mounted therein, adjacent the wall **23**, a contact **29** provided with projecting resilient fingers **30** extending into the holder so as to be engaged by the igniting unit and energize the same when the latter is in proper position on the holder. The contact is secured in the holder by a bolt **31** insulatedly mounted in the bushing **24**. The head of the bolt engages the inner face of the contact **29** and clamps it against the insulation **32**, which bears against the inner surface of the flange **24***a* of the bushing when the bolt, extending through the bushing and projecting therefrom, is locked in clamping relation with the bushing by a nut **33** threaded on the end of the bolt and insulated from the bushing by an insulating washer **34**.

The contact is connected to one terminal of the source of energy by a connector lug **36** mounted on the bolt **31** and connected by a suitable conductor **37** to the terminal of the source of energy. The connector lug is locked in place by a nut **38**, threaded on the end of the bolt.

With the contact insulatedly mounted on the holder and conected to one terminal of the source of energy, and the holder connected to the other terminal of the source of energy through the ground connection, a circuit is established which, upon being closed through the igniting unit, will cause it to become energized and brought up to the desired heat. The circuit is closed according to the present invention by slidably mounting the igniting unit in the holding device so that it is movable therein to a position in which it will simultaneously engage the two contacts and become energized.

The igniting unit of the present invention comprises a tubular metal sleeve **42** to be slidably mounted in the holding device and in electrical engagement therewith. The sleeve is moved in the holder by means of a handle **43** having a projection **43***a* and a neck **43***b*, which is positioned within one end of the sleeve **42** and secured by screws **44**.

The other end of the tubular metal sleeve is closed by a cap of insulating material **45** threaded thereto. The cap of insulating material has a reduced end portion which is covered by a metal cap **46**. This end of the igniting unit carries a heating element **47**, preferably in the form of a flat spiral. The heating element is disposed within a contact cup **48**, with one end secured to the cup and the other end secured to a central stud **49** which extends through the cap of insulating material and clamps the contact cup to the igniting unit. The central stud is, as shown in the drawings, suitably insulated from the contact cup by an insulating washer **50**.

The contact cup is so positioned that it will, when moved to energizing position, engage the contact fingers **30** and connect one end of the heating coil to one terminal of the source of energy. The other end of the heating coil is electrically connected to the metal sleeve **42** and thus to the other terminal of the source of energy through a normally closed switch **52**. This switch operates to control the circuit to the heating element when the igniting unit is held in the energizing position and prevent it from overheating.

As shown in the illustrated form of the invention, the switch is carried entirely by the igniting unit and has one portion connected at one end to the central stud which is connected to the inner end of the heating coil and the other end provided with a movable contact **53** to engage a fixed contact **54** secured to a finger **55** lanced inwardly from the tubular metal sleeve, which is in electrical engagement with the holder, and thus it completes the circuit to ground through the heating element.

The igniting unit is normally held in the holder in a shallow open-circuit position by a finger **51** lanced from the tubular metal sleeve adjacent the open end thereof. The finger has its end **51***a* turned outwardly to engage the end of the flange **21** of the holder. Manual pressure on the handle will cause the igniting unit to move further into the holder and causes the finger to flex into a recess **43***c* in the neck of the handle when the igniting unit is in closed-circuit position. Upon removal of the manual pressure, the resilient finger acting on the flange **21** will automatically move the igniting unit into its normal open-circuit position.

Preferably, the energizing circuit is so designed that a high value of current will be supplied to the heating element when the circuit is closed

in order to bring the heating element quickly to the desired heat. Inasmuch as the heating element heats up rapidly, a quick-acting switch is used to open the circuit quickly. While the quick-acting switch may take various forms, in the present preferred form of the invention it is heat-responsive and opens the circuit when the heating element reaches the desired heat. The switch comprises a heat-responsive conductor **56** which is so constructed that the current passing therethrough will heat it at the same rate at which the heating element heats and will open the circuit when the heating element has reached its predetermined heat.

To insure the opening of the circuit quickly, the heat-responsive conductor, which is made of bimetallic material, is provided with a pair of longitudinal slits **57** which form two side sections **58** and a center section **59** in edgewise relation extending longitudinally of the conductor. The center section **59** is so constructed that it is longer than the side sections **58**, and is buckled to extend beyond the plane of the conductor to either side thereof, and, depending upon the side to which it is buckled, will hold the contact in either of two positions. The center portion of the conductor may be buckled by stretching the material in this portion or by decreasing the length of the side position as by corrugating them, as shown in Fig. 5.

When the energizing current passes through the conductor, the center section will become heated and tend to flex and become stressed to the point at which it snaps over to the opposite side of the conductor. In doing so, it quickly moves the end of the conductor having the contact thereon away from the fixed contact.

In the form of the switch member, shown in Fig. 6, the conductor is slit longitudinally at **57***a* and the metal adjacent the edges of the slit is stretched, as at **59***a*, so that it is longer than the sides **58***a* and buckles and projects beyond the plane of the conductor at either side thereof, and, upon being heated, will quickly move the contact into open-circuit position.

With a high current passing through the contacts, provision must be made to reduce arcing at the contacts at the time when they are opened. In the form of the invention shown in Figs. 1 and 2, this is accomplished by connecting a resistance **61** across the contacts so that, when the contacts are opened the resistance is inserted in series with the heating element. This eliminates the arcing and reduces the current in the heating element.

While any form of resistor may be used, the resistor illustrated comprises a spiral of resistance material mounted so as to lie within the tubular shell and has one end secured to the shell and the other end secured by a conductor **62** to the contact. The resistance may be insulated from the shell by a sleeve **60**, or it may be positioned in the shell without the insulation and the oxidized film will be a sufficient insulation in view of the low voltage drop across the same.

In selecting the material for the resistance, it is desirable that the resistance be such that it will not become incandescent when the current passes therethrough when it is in series with the heating element, and the current will be reduced by the resistance to that value which is sufficient to maintain the heating element energized to produce a usable heat and also heat the heat-responsive conductor so that it remains in open-circuit position with the resistance connected in series with the heating element.

In the form of the invention shown in Figs. 3, 4 and 7 through 9, the circuit for energizing the heating coil includes a snap-acting switch of bimetallic material **52***b* and acting in the manner described in the previous form of the invention. However, in this form of the invention, the contact arrangement for preventing arcing differs inasmuch as an auxiliary contact is provided to carry the current at the instant the circuit at the main contacts **53***b*, **54***b* is opened. As is shown in the drawings, a metal sleeve **42** of the igniting unit is provided with a leaf spring **70** having one end secured thereto and its other end projecting into the interior of the igniting unit and carrying a carbon contact **71**. This contact engages a portion **72** of the snap-acting switch to close the circuit therefrom to ground through the metal sleeve of the holding device as well as through the contacts **53***b*, **54***b*.

When the heating element is brought to the desired heat, the central portion **59***b* of the snap-acting switch will flex and will quickly move the contacts apart.

Initial movement of the snap-acting switch will cause the contacts **53***b*, **54***b*, to open, as shown in Fig. 8, while the carbon contact maintains the circuit to the shell and thus prevents arcing between the before-mentioned contacts. When the snap-acting switch has reached its open-circuit position, as shown in Fig. 9, both sets of contacts will be opened.

In the form of the invention shown in Figs. 10 through 12, the snap-acting switch **52***c* has a bimetallic conductor **56***c* provided at its freely movable end with a contact **53***c* which projects from each face thereof, so that in either of its positions it will engage a fixed contact and close the circuit. As shown in Figs. 10 and 12, the switch is in its normal position and the contact **53***c* engages a contact **54***c* on the lanced-out finger **55***c* and connects the heating element directly to ground, thus completing the circuit for the heating element.

When the heating element is moved to closed-circuit position on the holder, as shown in Fig. 11, the heating coil will be brought to the desired heat and the heat-responsive conductor will flex to the position in which the contact thereon engages a contact **83** insulatedly mounted on a second finger **84** lanced from the housing. The contact is connected to a resistance **61***c* mounted in the igniting unit and insulated therefrom by a sleeve **60***c*, which resistance will be automatically inserted in series with the heating coil and will reduce the current flowing in the heating coil to that value which will maintain the heating coil at a proper igniting heat without burning it out.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. In an electric cigar lighter, a holding device; an igniting unit having a heating element thereon movably mounted on the holding device and removable therefrom for use; an energizing circuit for the heating element including a heat-responsive snap-acting switch mounted within the igniting unit and formed with means tending to snap it into either of two positions in accordance with its temperature, said switch being heated in accordance with the heating of the heating element; and a resistor spirally mounted on the

inner walls of the igniting unit and inserted into the circuit of the heating element by the switch when the heating element becomes heated to the desired heat and the switch is moved to one of its positions.

2. In an electric cigar lighter, a holding device; an igniting unit having a heating element thereon movably mounted on the holding device and removable therefrom for use; an energizing circuit for the heating element adapted to supply a high current to the heating element whereby the heating element quickly comes to the desired heat, said circuit including a heat-responsive conducting member adapted to be heated at the same rate as the heating element movably mounted within the igniting unit; a contact secured to the conducting member, and a fixed contact on the igniting unit cooperating with the movable contact to complete the circuit through the heating element, said heat-responsive conducting member flexing and moving the contact away from the fixed contact upon the conducting member reaching a predetermined heat; and means associated with the contacts to prevent arcing due to the high current passing therethrough when they are moved to open-circuit position, said means including an auxiliary carbon contact engageable with the heat-responsive conducting member until after the contacts have been separated.

3. In an electric cigar lighter, a holding device; an igniting unit having a heating element thereon movably mounted on the holding device and removable therefrom for use; an energizing circuit for the heating element adapted to supply a high current to the heating element whereby the heating element quickly comes to the desired heat, said circuit including a heat-responsive conductor adapted to be heated at the same rate as the heating element movably mounted within the igniting unit, a contact secured to the conductor, and a fixed contact on the igniting unit cooperating with the movable contact to complete the circuit through the heating element, said heat-responsive conductor moving the contact away from the fixed contact upon the conducting element reaching a predetermined heat; and means associated with the contacts to prevent arcing due to the high current passing therethrough when they are moved to open-circuit position, said means including a resistor connected across the contacts, which resistor is connected in series with the heating element when the contacts are open and reduces the current in the heating element to a value sufficient to maintain the heating element at the desired heat.

4. In an electric cigar lighter, a holding device; an igniting unit having a heating element thereon movably mounted on the holding device and removable therefrom for use; an energizing circuit for the heating element adapted to supply a high current to the heating element whereby the heating element quickly comes to the desired heat, said circuit including a heat-responsive conductor adapted to be heated at the same rate as the heating element movably mounted within the igniting unit, a contact secured to the conductor, and a fixed contact on the igniting unit cooperating with the movable contact to complete the circuit through the heating element, said heat-responsive conductor moving the contact away from the fixed contact upon the conducting element reaching a predetermined heat; and means associated with the contacts to prevent arcing due to the high current passing therethrough when they are moved to open-circuit position, said means including a resistor connected across the contacts, which resistor is connected in series with the heating element when the contacts are open and reduces the current in the heating element to a value to sufficiently maintain the heating element at the desired heat and the conductor heated sufficiently to maintain the contacts separated.

5. In an electric cigar lighter, a holding device; an igniting unit having a heating element thereon movably mounted on the holding device and removable therefrom for use; an energizing circuit for the heating element adapted to supply a high current to the heating element whereby the heating element quickly comes to the desired heat, said circuit including a heat-responsive bimetallic conductor adapted to be heated by current passing therethrough at the same rate as the heating element movably mounted within the igniting unit, a contact secured to said conductor to be moved thereby, and a fixed contact on the igniting unit cooperating with the movable contact; and a resistor mounted within the igniting unit and adapted to be connected in series with the heating element when the conductor is heated to reduce the current in the heating element to a value sufficient to maintain the heating element at the desired heat.

HERBERT G. LEHMANN.