March 1, 1966 A. T. LYBROOK 3,238,353

CIGAR LIGHTER

Filed Oct. 18, 1963

FIG. 1.

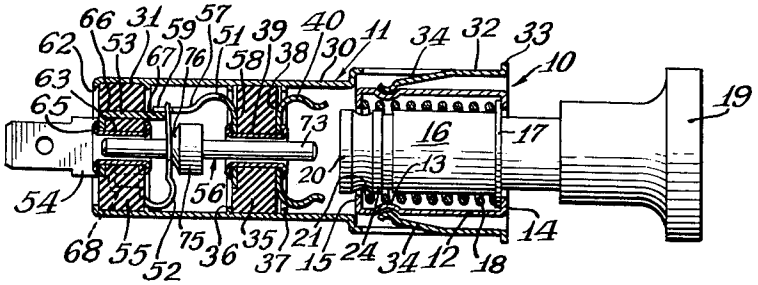


FIG. 2.

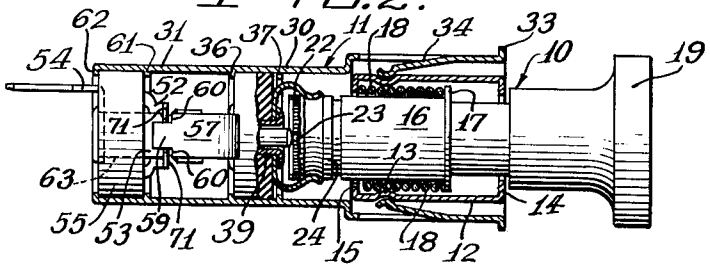


FIG. 3.

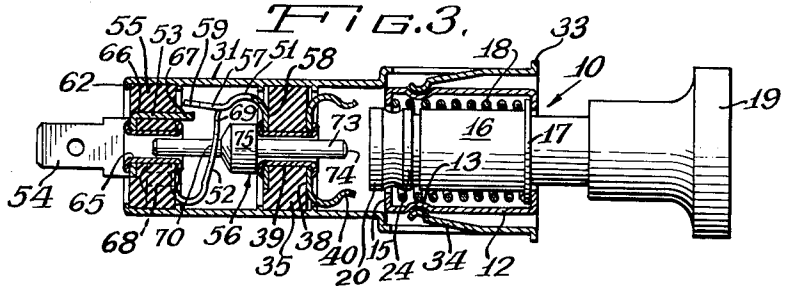
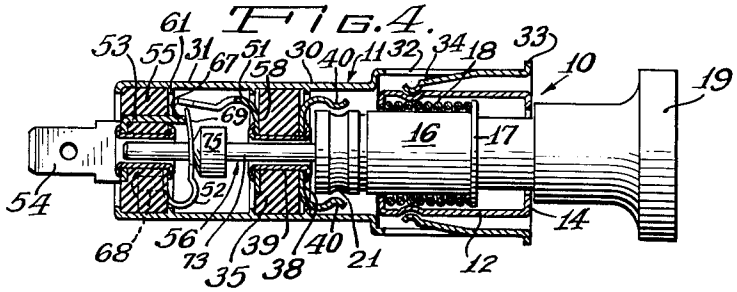


FIG. 4.



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CIGAR LIGHTER

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This invention relates to electric cigar lighters of the type commonly used in motor vehicles and, in particular, to improvements in circuit breakers immediately associated with such cigar lighters.

Electric cigar lighters of the type commonly in use today with motor vehicles typically comprise a tubular socket into which an igniting unit is removably inserted. The tublar socket has terminal means thereon connected to the electric power supply of the vehicle and arranged to cooperate with the terminal means of the igniter plug for energizing the heating element of the igniting unit. It has been a common practice to protect such cigar lighters from overheating by means of thermally responsive circuit breakers connected in the energizing circuit of the heating element. Whenever the heating element of the cigar lighter became overheated, such circuit breakers opened the energizing circuit of the heating element. Some of the prior circuit breakers of this character were of the destructible fuse type or of the manually resettable latch type. In most instances, the replacement or resetting of such circuit breakers was a difficult or inconvenient operation for the ordinary vehicle user. Some of the manually resettable type of circuit breakers had the further disadvantage of reenergizing the heating element during the resetting operation regardless of the temperature of the heating element. Other types of circuit breaks which automatically reclosed upon cooling of the cigar lighter heating element were not entirely satisfactory as they would repeatedly energize the heating elements with possible resultant damage to the cigar lighter. Many of the prior circuit breakers for cigar lighters had other disadvantages such as being relatively large in size, complicated in structure, expensive to manufacture and unreliable in operation.

Accordingly, it is an object of this invention to provide an improved circuit breaker for cigar lighters which may be relied upon to interrupt the circuit to the heating element in the igniter plug upon overheating thereof or when the current therein is excessive and which may be reset to close the circuit by a single thrust of the igniter plug.

Another object of this invention is to provide a cigar lighter having a manually reset circuit breaker including a bimetal latch element and a latch spring, such circuit breaker functioning to open the circuit to an overheated heating element in an igniter plug even though the resetting means is manually held closed and functioning to reclose the circuit only after cooling of the bimetal latch element in the circuit breaker to a safe temperature.

A further object of this invention is to provide a manually reset circuit breaker for cigar lighters which has a small, simple construction of few parts, is economical to manufacture and is reliable in use.

Other objects and advantages of the invention will be apparent from the following description and accompanying drawing in which:

FIGURE 1 is a longitudinal sectional view of a preferred embodiment of this invention showing the parts thereof in their normal positions;

FIGURE 2 is a longitudinal sectional view taken along the lines 2—2 of FIGURE 1 but showing the igniting unit in its heating position;

FIGURE 3 is a view similar to FIGURE 1 but showing the circuit breaker parts in their open circuit position; and

FIGURE 4 is a view similar to FIGURE 3 but showing the resetting of the circuit breaker.

Referring now to the drawing, there is shown a preferred form of this invention as incorporated into a cigar lighter assembly of the general type shown in United States Patent No. 2,338,565 issued January 4, 1944 to Philip E. Ashton and Edward Fowler. The cigar lighter assembly includes a removable igniter plug or unit **10** which is supported, when not in use, in a socket or receptacle **11** which may be mounted in the dashboard of an automobile. The igniter plug **10** is moved by the user from the manual position shown in FIGURE 1 into an energizing position shown in FIGURE 2 while a reverse movement removes the igniter plug **10** from the socket **11** for use.

The igniter plug **10** includes a tubular metal sleeve **12** provided with an embossed annular groove **13**. The sleeve **12** has an inturned flange **14** at its front end and an inturned flange **15** at its rear end. Slidable within the sleeve **12** is a tubular metal carrier **16** having an outturned flange **17** at its front end. Surrounding the carrier **16** is a helical coil spring **18** with its ends engaging the flanges **15** and **17** to normally hold the carrier **16** in the position shown in FIGURE 1. A knob or handle **19** is suitably secured at the front end of the carrier **16**. Mounted upon the rear end of the carrier **16** is a metal contact member **20** having an annular latching groove **21** and enclosing a spiral wound heating coil or element **22** (FIGURE 2). The heating coil **22** has one end secured to the contact member **20** and the other end secured to a central stud **23** which is electrically and mechanically connected to the carrier **16**. The contact member **20** is electrically insulated from the carrier **16** by means of a suitable insulator **24**.

The socket **11** includes a tubular sheet metal case or housing member **30** having a generally cylindrical rear portion **31** and an enlarged generally cylindrical front portion **32**. The front portion has an out-turned flange **33** adapted to engage an instrument panel of a vehicle or like mounting surface to which the case **30** may be suitably secured by any well known manner in electrical connection to the grounded side of the electrical system of the vehicle. A plurality of lanced spring fingers **34** project inwardly from the front portion **32** to frictionally engage the outside of the metal sleeve **12** of the igniter plug **10**. The ends of the spring fingers **34** are normally located in the groove **13** of the sleeve **12** to prevent accidental removal of the igniter plug **10**.

Intermediate the ends of the rear portion **31** of the case **30**, an annular disc-like insulator **35** of suitable ceramic material is held in position by suitable locking means which may take the form of two spaced annular ribs or projections **36** and **37** formed in the rear portion **31**. A combined thermostatic latch and contact member **38** is secured to the front face of the insulator **35** by a hollow rivet or eyelet **39** of suitable heat and electrical conductive material such as brass. The contact member **38** is formed of suitable bimetal material to have a plurality of spaced spring arms **40** which engages the contact member **20** when the igniter plug **10** is moved to its heating or energizing position. The arms **40** function in a well known manner to hold the igniter plug **10** in its heating position until the heat from the heating coil **22** causes opening of the arms **40** to release the igniter plug for use.

In accordance with the present invention, novel circuit breaker means is provided in the rear portion **31** of the case **30**. This circuit breaker means includes a thermostatic latch element **51**, a latch spring **52** formed from a

strip of suitable resilient metal such as brass, a stationary contact 53 which may be an integral part of a terminal connection 54 formed of brass or other metal, an annular insulator 55 to which the latch spring 52 and the terminal member 54 may be secured, and a plunger or drive pin 56 formed of suitable heat-resistant insulating material.

The latch element 51 is formed from thermostatic bimetal material of the type comprising welded together layers of metal having dissimilar temperature coefficients of expansion. This latch element 51 is generally L-shaped and includes a thermally responsive arm portion 57 and an enlarged base portion 58. At its outer or free end, the arm portion 57 is provided with a reduced width contact tongue or projection 59 flanked by the shoulders 60.

The rivet 39 passes through suitable openings in the base portion 58 of the latch element 51, the insulator 35, and the contact member 38, and has its ends turned over to tightly secure the latch element 51 and the contact member 38 to the insulator 35. It will be evident that the rivet 39 provides a good heat-conductive and electrically-conductive path between the contact member 38 and the latch element 51.

An annular rib or projection 61 formed in the wall of the rear case portion 31 cooperates with the inturned end 62 of the case 30 to support the insulator 55. The insulator 55 is formed of suitable insulating material with a central opening 63 through which a hollow rivet or eyelet 65 passes to secure the terminal connection 54 to the outer face of the insulator 55. The stationary contact 53 of the terminal connection 54 passes through a slot 66 in the insulator 55 with an inner free end providing a contact portion 67 arranged for engagement by the contact tongue 59 of the latch element 51.

The latch spring 52 has one end anchored to the insulator 55 by a rivet 68 or other suitable means in electrically insulated relation to the terminal connection 54. The latch spring 52 is bent back upon itself to provide an arm 69 which overlies the insulator 55 and the hollow rivet 65. The arm 69 is provided with an opening 70 substantially aligned with the hollow rivets 39 and 65. The arm 69 in its normal state is inclined toward the insulator 35 and normally tends to assume the position shown in FIGURE 3. The free end of the arm 69 is notched to provide a pair of lugs or projections 71 spaced to freely receive therebetween the contact tongue 59 of the latch element 51.

The plunger 56 is mounted for reciprocal movement in the hollow rivets 39 and 65 with the rear portion passing freely through the opening 70 in the latch spring 52. The front portion 73 of the plunger 56 has a rounded end 74 which is engaged by the stud 23 of the igniter plug 10. The plunger 56 has intermediate its length an integral cylindrical enlargement 75 which limits the movement of the plunger 56. The enlargement 75 is formed with a conical shoulder 76 adapted to abut the arm 69 of the latch spring 52.

In the normal closed-circuit position of the circuit breaker means of this invention, the contact tongue 59 of the latch element 51 is disposed betwen the two lugs 71 of the latch spring 52 with the lugs 71 engaging the shoulders 60 as shown in FIGURES 1 and 2 to hold the latch spring 52 in a biased condition. In this position of the latch element 51, the tongue 59 is in engagement with the stationary contact 53 to provide an electrical path from the terminal connection 53 to the contact member 38 through the stationary contact 53, the latch element 51 and the rivet 39.

When the latch element 51 is heated, the arm portion 57 tends to move the tongue 59 away from the arm 69 of the latch spring 52. If the latch element 51 is heated to a predetermined temperature, arm portion 57 moves sufficiently to free tongue 59 from the lugs 71 of the latch spring 52. The instant that the latch spring 52 is related, the arm 69 moves rapidly to the position shown in FIGURE 3, thereby forcing the latch element 51 away from the contact 53.

The latch spring 52 will remain in a released position until returned to a normal operative position by the rearward motion of the plunger 56. However, unless the latch element 51 has cooled sufficiently to allow arm portion 57 to return to its normal operative position, it is impossible to reset the latch spring 52 in latched engagement with the latch element 51. Even if the igniter plug is manually urged to the left as viewed in FIGURE 4, the heating element in the igniter plug will not be energized until the latch element 51 and the latch spring 52 are reengaged.

From the foregoing, it is seen that by the present invention there has been provided an improved circuit breaker for a cigar lighter which may be relied upon to interrupt the circuit to the heating element in response to an overload condition and which may be reset to close the circuit by a single thrust of the igniting unit. The circuit cannot be reclosed until the latch element has cooled to a predetermined safe temperature.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new, and desired to secure by Letters Patent of the United States, is:

1. In a cigar lighter having a socket for removably supporting an igniter plug, said igniter plug including a heating element, and combined thermostatic latch and contact means in said socket for engaging said igniter plug in response to manual actuation of said igniter plug and for releasing said igniter plug after said heating element has been heated to a predetermined condition, improved circuit breaker means comprising: spaced-apart insulator discs in said socket, a terminal affixed to one disc and being adapted to be connected to a source of electrical power, said terminal having a contact thereon, a bimetal latch element in said socket having a first arm affixed to the other insulator disc and having a second arm adapted to engage said contact for providing an electrical circuit through said bimetal latch element to said combined thermostatic latch and contact means, a latch spring in said socket for detachably holding said bimetal latch element, whereby upon overload, said bimetal latch element is released from said latch spring, opening said circuit to said combined thermostatic latch and contact means, and reciprocable means responsive to movement of said igniter plug for reengaging said bimetal latch element and said latch spring, said bimetal latch element being retained by said latch spring only after said bimetal latch element has cooled below a predetermined value.

2. In a cigar lighter having a socket for removably supporting an igniter plug, said igniter plug including a heating element, and combined thermostatic latch and contact means in said socket for engaging said igniter plug in response to manual actuation of said igniter plug and releasing said igniter plug after said heating element has been heated to a predetermined condition, improved circuit breaker means comprising a pair of insulator discs affixed in said socket and spaced from one another, terminal means carried by one of said insulator discs and adapted to be connected to a source of electrical power, said terminal means having an electrical contact thereon, a bimetal latch element in said socket having a first arm affixed to the other insulator disc and having a second arm adapted to engage said electrical contact; a latch spring having a first arm affixed to said one insulator disc and a second arm adapted to engage said second arm of said bimetal latch element and detachably holding said bimetal latch element, whereby upon overload said bimetal latch element will be released from engagement with said

latch spring, thereby separating said bimetal latch element and said electrical contact, and reciprocable means responsive to movement of said igniter plug for reengaging said bimetal latch element and said latch spring, said latch spring retaining said bimetal latch element only after said bimetal latch element has cooled below a predetermined value.

3. A cigar lighter as in claim 2, wherein said reciprocable means operatively engage said latch spring for repositioning said latch spring to engage said bimetal latch element.

4. In a cigar lighter having a socket for removably supporting an igniter plug, said igniter plug including a heating element, and combined thermostatic latch and contact means in said socket for engaging said igniter plug in response to manual actuation of said igniter plug and for releasing said igniter plug after said heating element has been heated to a predetermined condition, improved circuit breaker means comprising first and second spaced-apart insulator discs in said socket, a terminal affixed to said first insulator disc and being adapted to be connected to a source of electrical power, said terminal having contact means thereon, an L-shaped bimetal element in said socket having a first arm adapted to be connected to said second insulator disc and a second arm adapted to engage said contact means for providing an electrical circuit through said bimetal element to said combined thermostatic latch and contact means, means connecting said combined thermostatic latch and contact

means and said bimetal element to said second insulator disc, a latch spring for detachably engaging said bimetal element, said latch spring having a first arm affixed to said first insulator disc and a second arm adapted to engage said second arm of said bimetal element, whereby in response to an overload condition, said bimetal element will move out of engagement with said latch spring, thereby separating said bimetal element and said contact means and opening the circuit through said bimetal element, and reciprocable means responsive to movement of said igniter plug for repositioning said latch spring for engagement with said bimetal latch element, said engagement being made only after said bimetal latch element has cooled below a predetermined value, said reciprocable means comprising a plunger slidably supported in said first and second insulator discs.

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