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ELECTRIC CIGAR LIGHTER

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Fig. 1

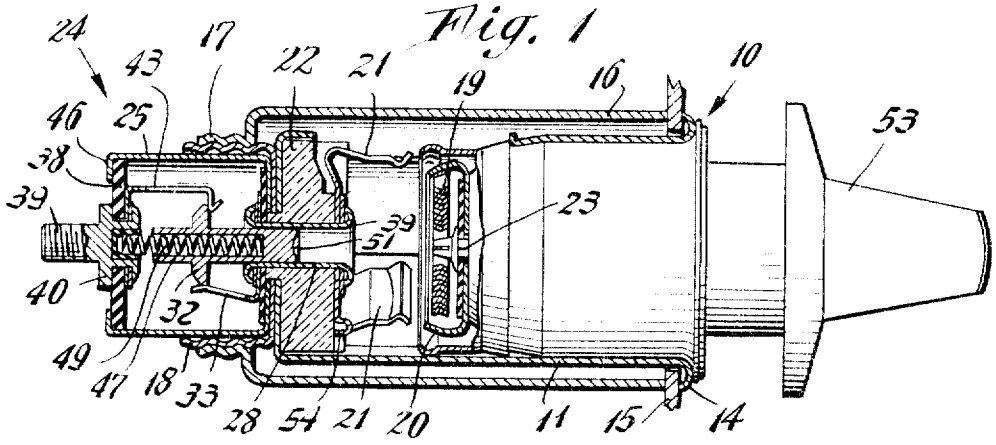


Fig. 2

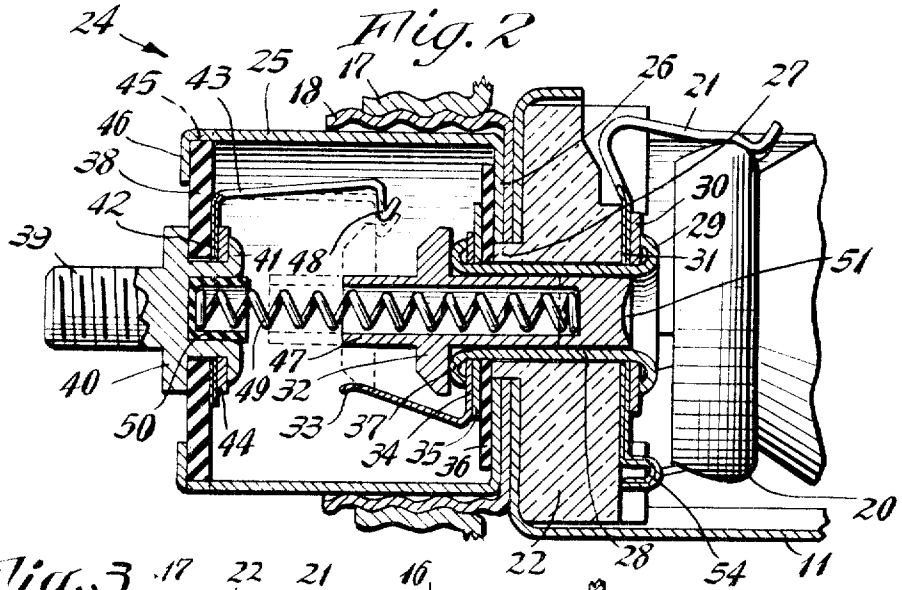
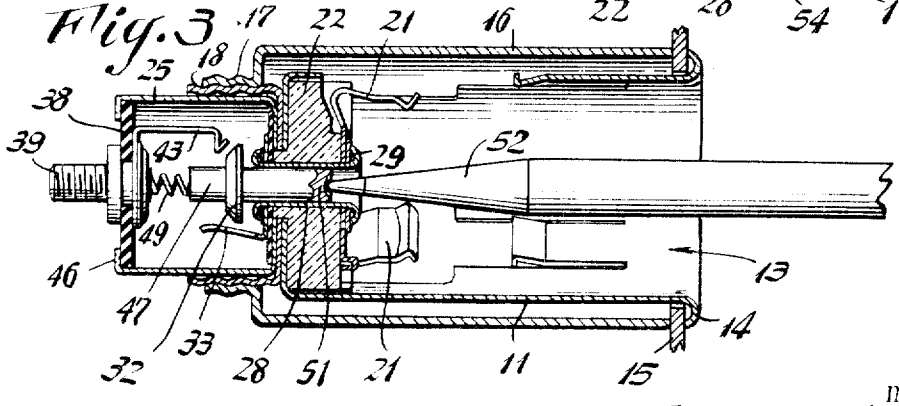


Fig. 3



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ELECTRIC CIGAR LIGHTER

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7 Claims. (Cl. 219—265)

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

ABSTRACT OF THE DISCLOSURE

The holder of an electric cigar lighter of the removable igniting unit type, has at its rear end a circuit breaker which may be reset from the front of the holder by engagement with an instrument passing through the holder after the igniting unit is removed therefrom.

This invention relates to electrical cigar lighters of the removable ignition type and more particularly to such cigar lighters having improved resettable circuit breaking means.

Heretofore it has been proposed to provide cigar lighters of the type referred to with safety devices such as fuses and circuit breakers which cause the circuit leading to the igniting unit from a battery or other source of supply to be opened if the device becomes heated to a dangerous degree by some malfunctioning of the lighter, a short circuit or the like.

Such safety devices such as fuses have been mounted on the cigar lighter for removal and replacement after the fault has been corrected, but this involves considerable annoyance and some cost. Other safety devices have been of the heat-responsive automatically resettable type which repeatedly open, reclose and open the circuit until the fault is removed after which they then reclose the circuit. The continued reclosing and opening of the circuit if it continues unnoticed for any considerable time places a severe drain on the battery of the motor vehicle and can result in the complete discharge of the battery.

Another type of safety device provides for opening the circuit in case of a fault and keeping it open until reset manually. However, as heretofore proposed, such devices could only be reset when attached to a cigar lighter mounted on the instrument panel by reaching up around the lower edge of the instrument panel to gain access to the back end of the lighter, if in fact the safety device could be reached in that way. Otherwise, the lighter would have to be removed from the instrument panel, as it would in the case of the lighters mounted elsewhere in the vehicle.

Another disadvantage of the safety devices of cigar lighters as heretofore provided is that when the circuit was opened there was nothing to indicate that fact except that the igniter would not be heated for use, and whether or not a fault existed or whether the heating element was burned out could not be determined until the heating element was examined and tested.

An object of this invention is, therefore, to provide a cigar lighter with a manually resettable circuit breaker having means which is accessible to be operated to reset the circuit breaker through the open end of the holder for the removable igniting unit when the latter is removed from the holder, thus avoiding the difficulties of reaching the reset means to reset the device.

Another object is to provide a cigar lighter with means

for indicating that the circuit breaker has opened the circuit so that the fault which caused its operation can be investigated and corrected. Preferably such indicating means may be observable through the open end of the holder when the igniter is removed.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

FIGURE 1 is a longitudinal cross section of a cigar lighter embodying the present invention with part of the igniter shown in elevation, the circuit breaker being shown in closed circuit position.

FIG. 2 is an enlarged fragmentary sectional view of the inner end of the cigar lighter showing the circuit breaker in open circuit position.

FIG. 3 is a sectional view of the holder with the igniter removed showing the circuit breaker in the act of being reset by an instrument such as a tapered wooden stick extending into the open end of the holder.

In the accompanying drawings the cigar lighter shown is of the type having an igniting unit **10** which is removably mounted on a holder **11** which is in the form of a hollow tube having an open end **13** provided with a flange **14**. The holder **11** is usually inserted in a hole in the instrument panel **15** where it is held by a clamping sleeve **16** having a threaded neck **17** engaging a threaded collar **18** on the inner end of the holder by which the outer end of the sleeve is forced against the inner surface of the panel **15** and the flange **14** of the holder is forced against the outer surface of the panel.

The igniting unit has a heating element **19** comprising a spiral coil of resistance wire mounted in a contact cup **20** to which one end of the wire is connected.

When the igniting unit is to be energized the contact cup **20** is caused to engage bimetallic contact fingers **21** carried by an insulating block **22** in the bottom of the holder. Usually the contact fingers **21** are secured to the block **22** by a terminal which is connectible to the live leg of the battery or other source of current. The other leg of the battery being grounded, the circuit to the heating element wire is completed through the chassis of the vehicle, the panel **15**, holder **11**, igniter **10** to the post **23** of the heating element through the latter to the cup **20** and contact fingers **21** back to the battery.

According to the present invention the contact fingers **21** are connected to the live leg of the battery by a circuit breaker indicated generally by the reference number **24**. It comprises a housing **25** having a centrally apertured flat bottom **26** mounted on a boss **27** on the insulating block **22** on which the centrally apertured portions of the holder **11** and collar **18** are also mounted. The housing **25** is secured in position projecting from the closed end of the holder **11** by an eyelet **28** which extends through the insulating block and has its spun-over end **29** engaging a washer **30** which in turn secures the base **31** of the contact fingers **21** to the block **22**.

Within the housing **25** there is a contact arm **33** having a base **34** which is mounted on the eyelet **28**. Between the base **34** and the bottom **26** of the housing there are interposed a metal washer **35** and an insulating washer **36** so that when the inner end **37** of the eyelet is spun over the assembled parts, comprising the base **34**, the contact **33**, the washer **35**, the insulating washer **36**, the housing **25**, the sleeve **18**, the holder **11**, the insulating block **22**, the base for the contact fingers **21** and the washer **30**, will all be secured together in coaxial alignment, and the contact arm **33** will be electrically connected to the contact fingers **21** and insulated from the holder **11**, the sleeve **18** and the housing **25**.

The other end of the housing **25** is closed by a disk **38** of insulating material which has a central aperture

in which is mounted a threaded stud **39**, a flange **40** of which engages the outer face of the disk while the spun-over neck **41** secures the base **42** of a bimetallic contact arm **43** and a washer **44** against the inner face of the disk **38**. The disk **38** abuts the end of the housing **25** and is held in fixed position thereon by bent-over ears **46** which pass through peripheral notches **45** in the disk to be held thereby against rotation relative to the housing. The threaded stud **39** constitutes a terminal to which a lead wire from a battery or other source of current may be connected, and when this is done the bimetallic contact arm **43** becomes energized.

To close the gap between the current-carrying arm **43** and the contact arm **33** which is connected to the contacts **21**, the present invention provides a conducting disk **32** mounted on or integral with a plunger **47** which is slidably mounted in the eyelet **28** and which in its normal closed circuit position shown in FIG. 1 simultaneously engages the contact arms **33** and **43**.

The contact arm **43** is provided with a hook portion **48** which engages over the peripheral edge of the disk **32** and holds the disk in its circuit closing position.

If, in the operation of the cigar lighter, due to some fault, for instance, a short circuit or improper operation, excessive heat is produced by the heating element **19**, the heat is transferred through the eyelet **28**, the plunger **47** and the disk **32** to the contact arm **43**. The arm **43** being made of bimetal, when it becomes heated it moves radially outwardly so that the hook portion **48** will move away from the edge of the disk **32**. When this happens, due to the operation of a spring **49**, the plunger moves from the dotted line position shown in FIG. 2 to the full line position shown therein, thus breaking the circuit between the contact arms **33** and **43**. The spring **49** is partly housed in the plunger **47** while its other end is held in an insulating cup **50** nested in the stud **39**. Thus, the circuit to the heating element is broken and will remain broken until the plunger **47** is operated to move the disk **32** to the position shown in FIG. 1. The same operations occur if, as shown in FIG. 1, a short circuit causes the current in the contact arm **43** to overheat it.

As pointed out above, the present invention provides a cigar lighter having a manually resettable circuit breaker which can be reset from the open end of the holder **11**. To accomplish this, the plunger **47** is made of such length that its end **51** may be engaged for operation by means of an implement such as the pointed stick of wood **52** shown in FIG. 3 which may enter the eyelet **28** and be applied to the plunger so as to force the plunger inwardly of the housing **25** to permit the hooked end **48** of the spring contact arm **43** to engage and retain the disk **32** in closed circuit position. This resetting operation is performed, of course, after the igniter is removed from the holder and after the holder, and particularly the bimetallic spring contact **43**, has had an opportunity to cool off. Should the plunger be operated before this or while the fault or short circuit still exists, it will immediately return to the position shown in FIG. 2.

In order to indicate that the circuit has been broken, the plunger **47** is of such length that when it is in its open circuit position it can be seen prominently near the end of the eyelet by looking into the holder **11**, while in its normal circuit closing position it can be observed as deep in the eyelet.

It should be noted that since the plunger **47** is in contact with the eyelet and the eyelet is in contact with the bimetallic contact fingers **21**, in the broader aspects of this invention the contact **33** could be omitted. However, to insure satisfactory contacts under pressure, it is preferable to close the circuit between the contact spring **43** and the contact spring **33** which has firm electrical engagement with the eyelet.

In the cigar lighter illustrated, when the heating element **19** is to be energized the knob **53** is pressed inwardly causing the contact cup **20** to engage the bimetallic contact

fingers **21** and is held in that position until the heating element **19** becomes sufficiently hot for use, whereupon the bimetallic fingers **21** yield and permit the igniting unit with the cup **20** to return to open circuit position by spring means contained within the igniting unit in a manner well known in the art. It is the operation of the bimetallic fingers **21** which controls the normal closing and opening of the circuit to the heating element. If the heating element is released properly by the bimetallic fingers, as soon as it becomes sufficiently hot for use insufficient heat will be transmitted to the bimetallic latch finger **43** and the circuit breaker will remain in closed circuit position. However, if the contacts **21** fail to release the contact cup **20** or if the igniting unit is held in by hand or otherwise, excessive heat will be transmitted through the metallic parts to the latch finger **43** causing it to deform and allowing the conducting disk **32** to disengage the contact **43**.

The same operations will occur if the latch finger **43** becomes overheated by the current passing through it which would occur when a short circuit exists between the current carrying contacts **21** and the grounded holder **11**.

The heating element **19** is prevented from engaging the inner end **29** of the eyelet **28** by stop lugs **54** formed integral with the contact fingers **21** and which will engage the edge of the cup **20** of the latter before the heating element can contact the spun-over end **29** of the eyelet.

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

I claim:

1. In an electric cigar lighter having an elongate holder having a cavity for supporting an igniting unit for removal and replacement therein through an open end of the holder and a bottom wall for closing the other end of the holder; electric contact means including means mounted on the bottom wall of the holder adapted to engage the inner end of the igniting unit for completing an electric circuit to the igniting unit when the latter is to be energized, the improvement comprising a normally closed heat-responsive circuit breaker in said electric circuit between a source of current supply and said contact means on the holder and having means normally maintaining said circuit closed but responsive to heat in excess of normal operating heat to open the circuit to said contact means, said circuit breaker comprising a housing mounted on and projecting from the exterior of said bottom wall of the holder, an input terminal mounted on said housing, and means accessible through the open end of the holder when the igniting unit is removed from the holder for manually resetting the circuit breaker.

2. A cigar lighter according to claim [1] *7* in which the circuit breaker also has means observable by the user when the igniting unit is removed from the holder to indicate that the circuit breaker has operated to open the circuit.

3. A cigar lighter according to claim [1] *7* in which the circuit breaker includes a pair of spaced resilient metal fingers, one of which is electrically connected to said input terminal and the other of which is electrically connected to said contact means, and an axially movable conductor adapted to engage and electrically connect and disengage and electrically disconnect said resilient fingers to close and open a circuit between the input terminal and said contact means, one of said resilient fingers having a latch portion to engage and hold said movable conductor in circuit-closing position, said latch-carrying finger being bimetallic and biased to release said axially movable conductor when excessively heated, and spring means for moving the axially movable conductor to position to open the circuit between said resilient fingers when released by said latch-carrying finger.

4. A cigar lighter according to claim [3] *3* in which the means for resetting the circuit breaker includes means connected to the axially movable means and extending

through [the bottom wall of] *support means in* the holder in the direction of the open end of the latter.

5. A holder for the igniting unit of a cigar lighter having a cavity for removably supporting an igniting unit, the bottom of the cavity being constituted by a wall; insulating means engaging said wall and having projecting contacts thereon for engagement with the igniting unit; a housing mounted on said wall at the exterior side thereof and an eyelet passing through said insulating block and engaging said contact means and securing the housing to the holder; a first resilient contact finger secured to said wall by said eyelet and projecting therefrom into the housing; an end block of insulating material closing the rear end of said housing; an input terminal secured to said end block; a second resilient contact finger in said housing in electrical engagement with said input terminal and having a latch portion on its free end; a plunger slidably mounted in said eyelet for axial movement; conductor means carried by said plunger for simultaneous engagement with said first and second resilient contact fingers for closing the circuit between the same; and resilient means normally urging said conductor to a position in which said fingers are disengaged, said latch-carrying finger being bimetallic and biased to release said conductor when excessively heated, the end of said axially movable plunger being accessible through the cavity of the holder and the eyelet for engagement with a hand-held means to move the plunger and the conductor to position to reengage the resilient finger and be held in closed circuit position by the latch on said bimetallic finger.

6. A holder for an igniting unit of a cigar lighter according to claim [6] 5 in which the accessible end of the plunger is visible through the holder cavity and the eyelet and is of such length relative to the length of the eyelet that its proximity to the end of the eyelet indicates that the conductor is in open circuit position.

7. In an electric cigar lighter having an elongate holder having a cavity for supporting an igniting unit for removal and replacement therein through an open end of the holder, and support means in the holder; heat responsive electric contact means in said holder including means mounted on said support means adapted to engage the inner end of the igniting unit for completing an electric circuit from a source of current supply to the igniting unit when the latter is to be energized and for opening said circuit when the igniting unit reaches normal operating temperature for use, the improvement comprising a normally closed heat-responsive circuit breaker in said electric circuit between said source of current supply and said contact means in the holder, said circuit breaker having means normally maintaining said circuit closed but responsive to heat substantially in excess of said normal operating temperature to open the circuit to said contact means, and means accessible through the open end of the holder when the igniting unit is removed from the holder for manually resetting the circuit breaker.

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