April 15, 1969 L. G. HORWITT 3,439,148

ELECTRIC CIGAR LIGHTER

Filed Nov. 1, 1966

Fig. 1

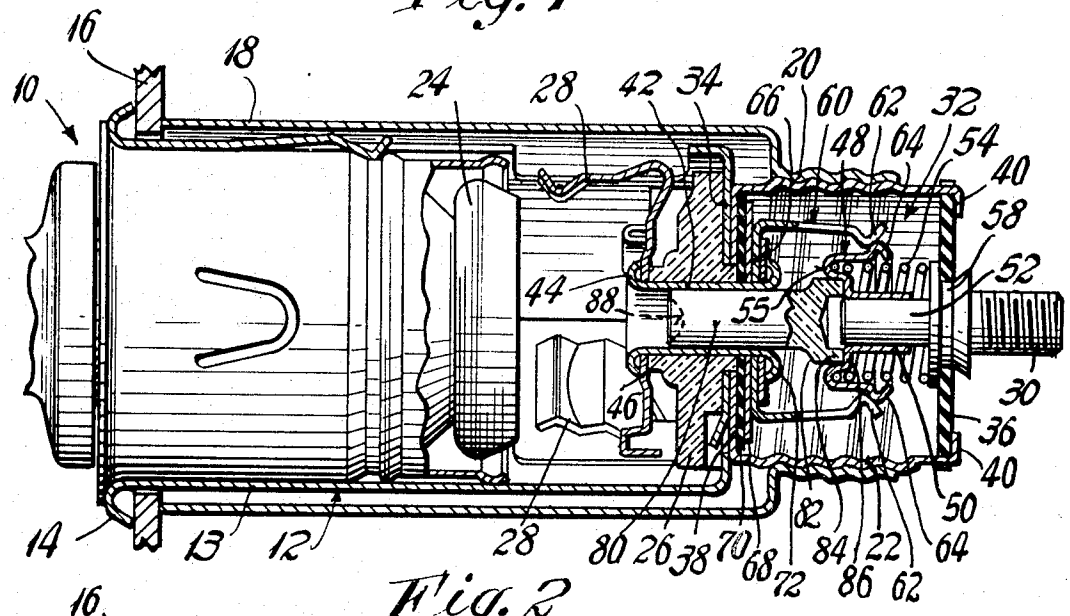


Fig. 2

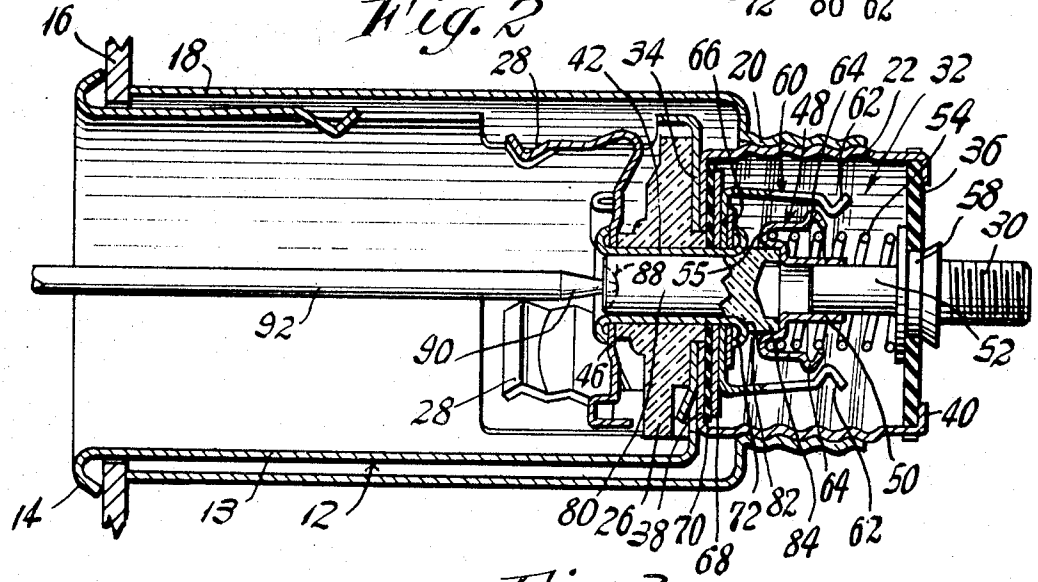
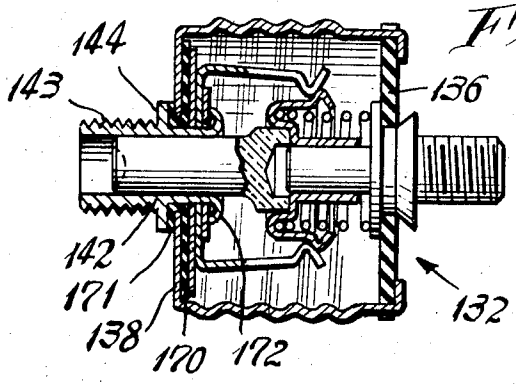


Fig. 3



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ELECTRIC CIGAR LIGHTER

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ABSTRACT OF THE DISCLOSURE

An electrical cigar lighter having a circuit breaker comprising a housing, means for attaching the housing on the rear end of the igniting unit receptacle, the housing having a movable circuit-closing member which is engageable by heat responsive latching means to hold the circuit closed and which releases the circuit-closing member when overheated, the circuit-closing member being resettable through the means by which the housing is attached to the receptacle against the tension of a spring which conducts the current from an input terminal to the circuit-closing member.

This invention relates generally to electrically energized cigar lighters, and more particularly to such cigar lighters having improved circuit breaker means for protecting the cigar lighter against the effects of a fault condition in the electric circuit.

In my U.S. Patent No. 3,230,345 granted January 18, 1966, there is disclosed a cigar lighter having a holder for an igniting unit having circuit breaker means interposed between a current input terminal adjacent the back or inner end of the holder and heat responsive contact means monuted on a suitable support within the holder, the contact means in the holder making contact with the inner end of the igniting unit when the latter is to be energized and opening that contact when the igniting unit reaches a normal operating temperature.

In the circuit breaker disclosed in said patent, an axially slidable circuit making and breaking metal plunger has a contact portion for normally completing an electric circuit between a bimetallic heat responsive latching finger electrically connected to an input terminal and the contact means in the holder. The contact portion of the plunger is cylindrical and slides somewhat loosely within a concentric cylindrical eyelet which passes through the support means in the holder and secures the contact means thereto.

While the foregoing construction is highly advantageous in that the outer end of the metal plunger is accessible through the open end of the holder for resetting the circuit breaker, and is visible to give an indication of whether the plunger is in closed or open circuit position, it nevertheless suffers the disadvantage that the electric circuit between the input terminal on the back of the holder and the contact means in the holder is dependent, either directly or indirectly, upon a somewhat loose sliding contact between two metal elongate surfaces. Such contact in an electric circuit is undesirable because it tends toward arcing when a circuit breaker is being reset, thus pitting the metal and inhibiting free sliding movement of the parts. Also, with the elongate concentric circular contact surfaces involved in the above construction, tolerances which must be maintained for a smooth sliding fit of the parts permits dirt and other foreign matter to accumulate between the contact surfaces, thereby rendering good electrical contact over a long period of time somewhat uncertain. Further, the arrangement of parts described above requires a relatively complex input terminal mounting means to prevent a short circuit through the circuit breaker housing.

The present invention is directed toward a cigar lighter, of the general type described above, having an improved circuit breaker construction which avoids or substantially eliminates the foregoing disadvantages, and yet retains the advantageous features of the circuit breaker of that cigar lighter. Accordingly, it is a principal object of the present invention to provide a cigar lighter having an improved circuit breaker which is more reliable in operation, longer lasting, and less complex and costly than heretofore known circuit breaker constructions.

Another object is to provide a cigar lighter having a circuit breaker in which loosely sliding elongate metal surface parts are eliminated from the primary electric circuit.

Still another object is to provide a cigar lighter having a circuit breaker in which means accessible through the open end of the holder for resetting the circuit breaker is not in the electric circuit.

Another object is to provide a cigar lighter having a circuit breaker in which spring means normally urging one of the circuit breaker parts toward an open circuit position is utilized as a part of the electric circuit so as to simplify the circuit breaker housing construction, as well as to further assure positive electric contact between relatively movable parts.

Still another object of the present invention is to provide a circuit breaker for a current consuming device in which the circuit breaking parts are contained within an enclosure which is removably and replaceably electrically connected to the current consuming device.

Other advantages and features of the invention will hereinafter appear.

In the accompanying drawings:

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

FIG. 2 is a view similar to FIGURE 1, but with the igniter unit removed and with the circuit breaker being shown in open circuit position; and

FIG. 3 is a cross sectional view of an alternate form of circuit breaker housing.

Referring to the drawings, and particularly to FIGURE 1, one embodiment of the present invention comprises a cigar lighter of the type having an igniting unit **10** which is removably supported within a holder **12** which comprises a hollow tube or well **13** having an open end surrounded by a flange **14**. The holder is inserted through an aperture in the instrument panel **16** of an automobile or other suitable mounting surface, and is secured therein by a clamping sleeve **18** which has a threaded neck **20** engaging a threaded portion **22** on the back end of the holder **12**, thereby forcing the outer end of the clamping sleeve against the inner surface of the panel **16**.

The igniting unit **10** has a heating coil (not shown) which is contained within a contact cup **24** to which one end of the heating coil is connected. The other end of the heating coil is grounded through the body of the igniting unit **10**, the holder **12**, and the panel **16**.

The holder **12** also includes a support means in the form of an insulating block **26** to which is secured a plurality of bimetallic contact fingers **28** which engage and hold the contact cup **24** of the igniting unit **10** when the latter is to be energized, and which move in response to heat, when the igniting unit heating coil reaches normal operating temperature to open the circuit to the heating coil.

The contact fingers **28** are connected, as will be described, to a suitable source of current, such as the automobile battery, by means of an input terminal **30** which is carried by the inner end of the holder **12**. Intermediate the contact fingers **28** and the input terminal **30** is a cir-

cuit breaker **32** located generally as in the manner of the abovementioned patent.

Thus, the circuit breaker is located within a housing defined by the threaded portion **22** of the holder, a wall **34** thereof, and an insulating disc **36** carried by the innermost end of the threaded portion **22**. The threaded portion also has an integral inturned flange **38** adjacent the wall **34**, and inturned tabs **40** which secure the disc **36** to the threaded portion **22**. The threaded portion **22** is secured to the wall **34** by means of an eyelet **42** which extends through the insulating block **26**, the wall **34** and the flange **38**, and has its inner end **44** spun over a flat disc-like portion **46** of the contact fingers **28**.

According to the principles of the present invention, the circuit breaker **32** comprises a movably mounted generally cup-shaped contact member **48** which has a central sleeve portion **50** adapted to fit over an extension **52** of the input terminal **30**, thus guiding the contact member **48** for axial movement. A coil spring **54** surrounds the sleeve portion **50** of the contact member **48**, and has one end seated in an annular recess **55** in that member, the other end of the spring **54** bearing against a metal washer **56** which in turn contacts a metal retaining member **58** which secures the input terminal **30** to the insulating disc **36**.

Although electrical contact may be made between the sleeve portion **50** of the contact member **48** and the extension **52** of the input terminal **30**, it is preferable to employ the spring **54** as the primary contact means between these members. To this end the spring is formed as a bimetallic wire having a copper-clad steel core, thus facilitating good electrical contact between the metal washer **56** and the contact member **48**, regardless of the position of the latter. If desired, the extension **52** of the input terminal may be formed of a nonconducting material.

The circuit breaker also includes a heat responsive electrically conductive latching means **60** in the form of a pair of opposed bimetallic latching fingers each having a hook portion **62** which engages with a peripheral outwardly protruding lip **64** formed on the radially outwardly free end of the contact member **48**. The bimetallic fingers **60** are integral with an apertured disc **66** which surrounds the eyelet **42** in electrically conducting relationship therewith. Between the disc **66** and the flange **38** there are interposed a metal contact washer **68** and an insulating washer **70** so that when the inner end **72** of the eyelet is spun over, the assembled parts, comprising the disc **66**, the metal washer **68**, the insulating washer **70**, the flange **38**, the wall **34**, the insulating block **26**, and the disc portion **46** of the contact fingers **28**, will all be secured together in axial alignment, and the latching fingers **60** will be electrically connected to the contact fingers **28** and insulated from the holder **12** and the threaded portion **22**.

If, in the operation of the cigar lighter, a fault condition occurs which causes the heating coil of the igniting unit **10** to heat excessively, the heat is transferred through the eyelet **42** and the apertured disc **66** to the bimetallic fingers **60**. This causes the fingers to move radially outwardly so that the hook portions **62** will move away from the lip **64** to release the contact member **48** for movement toward the wall portion **13** of the holder **12**. This causes the lip **64** to move out of electrical contact with the hook portions **62** of the fingers **60** to break the circuit between the input terminal **30** and the contact fingers **28** in the well. This position of the parts is illustrated in FIG. 2 of the drawings.

The fault condition which causes the foregoing operation may be either an overheating condition of the igniting unit heating coil or a short circuit which causes an excessive amount of current to flow through the bimetallic fingers **60**, thereby causing them to overheat and move outwardly as described.

In order to reset the circuit breaker after removal of a fault condition which has caused the circuit breaker

to operate, a reset pin **80** is axially slidably received within the eyelet **42**, the reset pin **80** having an annular abutment surface **82** adapted to abut the spun over end **72** of the eyelet to limit the amount of axial movement of the reset pin in the direction of urging of the spring **54**. The reset pin also has an axially extending annular protrusion **84** which is shaped to seat on a ledge **86** of the contact member **48** so as to be moved thereby when the circuit breaker operates to move the contact member **48** to its open circuit position, as seen in FIG. 2.

A feature of the present invention is that the reset pin **80** is made of a ceramic material so that it effectively insulates the contact member **48** from the eyelet **42** and assures that the only circuit from one to the other is through the latch engaging bimetallic fingers **60**.

The end of the reset pin **80** adjacent the well **13** is provided with a depression **88** adapted to receive the pointed end **90** of a wooden stick **92** or other suitable instrument which can be inserted into the well through the open end thereof to reset the circuit breaker as illustrated in FIG. 2.

A significant improvement of this invention resides in the relative placement of the movable contact member **48** and the bimetallic latching means **60** of the circuit breaker. By fixedly mounting the bimetallic latching means **60** in direct contact with the contact fingers **28** in the well **13**, and by providing for direct contact of the movable contact member **48** with the input terminal **30**, a simplified and less costly housing construction is achieved. This is because the spring **54** employed to operate the circuit breaker in response to movement of the bimetallic latching fingers need not be insulated from the input terminal, since it is in the input circuit to the circuit breaker rather than being in contact with the output circuit from he circuit breaker as was the case in the above-mentioned patent, which construction required that the rear wall of the circuit breaker housing be provided with means to insulate the operating spring from the input terminal.

FIG. 3 illustrates an alternate circuit breaker which has means for securing the device to a cigar lighter holder or other electrical device to be protected. It may be as a whole removable and replaceable on a cigar lighter holder or other device. In this embodiment the circuit breaker is enclosed within a housing **132** which is substantially identical to that described above from the insulating disc **136** to the inturned flange **138**. However, the eyelet **42** of the previous embodiment has been replaced with an eyelet **142** which is spun over within the circuit breaker housing, but has an externally threaded portion **143** which is adapted to be engaged with the internally threaded portion of a similar eyelet (not shown) secured to the device to be protected. The eyelet **142** has a radially extending flange **144** so that the several parts enumerated above may be clinched between it and the spun over end **172** of the eyelet **142**. The insulating washer **170** is provided with a U-shaped terminus **171** so as to effectively insulate the flange **144** on the eyelet **142** from the inturned flange **138** of the circuit breaker housing. This construction facilitates replacement of the circuit breaker in the event that the latter should become damaged or otherwise inoperable.

It will now be apparent, from the foregoing, that there is provided a cigar lighter having a greatly improved resettable circuit breaker incorporated therewith. Good electrical contact is insured at all times by virtue of the bimetallic spring **54** being interposed between the input terminal **30** and the movable contact member **48**. A positive electric circuit is also assured between the latching fingers **60** and the contact fingers **28** in the well and by mounting the bimetallic latching fingers **60** on the eyelet **42** connecting directly with the contact fingers **28**, a greatly simplified construction is achieved, since the circuit opening spring **54** need not be insulated from the input terminal **30**. Thus a longer lasting and more efficient cir-

cuit breaker is achieved through simplified and less costly construction.

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. A holder for the igniting unit of an electric cigar lighter comprising an elongate hollow well open at one end and adapted to removably support an igniting unit therein, said well having support means therein, heat responsive electric contact means mounted in the well on said support means and adapted to engage the inner end of the igniting unit for making electric contact therewith when the igniting unit is to be energized and for opening said electric contact when the igniting unit reaches a normal operating temperature, electric input means mounted on the well but insulated therefrom and adapted to be connected to a source of electric current, and circuit breaker means interposed, and normally establishing an electric circuit, between the input means and the contact means in the well, said circuit breaker means comprising a movably mounted contact member electrically connected to said input means, means normally urging said contact member in one direction of movement, heat responsive electrically conductive latching means electrically connected to said contact means in the well, said latching means normally engaging said movable contact member in a closed circuit position and being responsive to temperature in excess of said normal operating temperature to release said contact member for movement to an open circuit position under the action of said urging means, and means accessible through the open end of the well when the igniting unit is removed therefrom for moving said contact member in the opposite direction back into engagement with said latching means to reset the circuit breaker when said excessive temperature is dissipated.

2. A holder according to claim 1 wherein said means urging the contact member comprises spring means interposed between the input means and the contact member normally urging said contact member away from said latching means, said spring means constituting the electrical connection between said contact member and said input means.

3. A holder according to claim 2 wherein said spring means comprises a bimetallic coil spring having a copper-clad steel core.

4. A holder according to claim 1 wherein the means accessible through the open end of the well for moving the contact member comprises a plunger slidably carried by said support means in the well and having a portion abutting said contact member, said plunger being accessible through the open end of the well for engagement with a hand-held means for moving said plunger and said contact member in a direction against said urging means to reengage said contact member with said latching means after the latter has operated to release said contact member.

5. A holder according to claim 4 wherein said plunger is formed of an electrically insulating material whereby said plunger is not in the electric circuit between said input means and said contact means in the well in either said circuit making or circuit breaking positions of said contact member.

6. A holder according to claim 1 wherein said bimetallic latching means comprises a plurality of latching fingers fixedly secured to said mounting means in the well, said latching fingers extending axially away from said mounting means and terminating in latching hooks, and wherein said contact member is substantially cup-shaped having a peripheral radially outwardly protruding lip positioned for engagement by said latching hooks, said latching fingers being biased radially inwardly to hold said contact member in said closed circuit position and being responsive to temperatures in excess of said normal operating temperature to move radially outwardly to disengage from said peripheral lip to release said cup-shaped contact member.

7. A holder according to claim 6 wherein said means urging the contact member comprises spring means interposed between the input means and said cup-shaped contact member and normally urging the latter away from the latching hooks on said latching fingers, said spring means constituting the electrical connection between said cup-shaped member and said input means.

8. A holder according to claim 7 wherein the well includes an insulating disc carried on the axial inner end of the well, said input means being mounted on said insulating disc, and wherein said spring means comprises a coil spring having one end seated in a recess in said cup-shaped contact member and the other end abutting said input means.

9. A circuit breaker adapted for connection to a current consuming device comprising a housing having a hollow enclosure and spaced parallel first and second end walls, said first end wall being formed of electrically insulating material, electric input means mounted on said first end wall having means for connection to a source of electric current, tubular attaching means mounted on the second end wall for attaching said enclosure to a current consuming device, a movably mounted contact member within said enclosure and electrically connected to said input means and having a cup, a coil spring having one end seated in said cup and the other end engaging the input means for normally urging said contact member in one direction of the second wall, said coil spring constituting the primary electrical connection between said input means and the cup of said contact means, heat responsive electrically conductive bimetallic latching means in said enclosure and electrically connected to said tubular attaching means, said latching means normally engaging said contact member in a closed circuit position and being responsive to temperature in excess of a predetermined maximum temperature to release said contact member for movement in the direction of the second wall to an open circuit position under the action of said coil spring, and electrically non-conductive reset means accessible from the exterior of the housing through said tubular attaching means for moving said cup against the tension of said coil spring in the direction back toward said second wall into engagement with said latching means to reset the circuit breaker when said excessive temperature is reduced to below said maximum.

10. A circuit breaker according to claim 9 in which the coil spring is formed of copper-clad steel wire whereby the spring is mechanically strong and has good electrical conductivity.

References Cited

UNITED STATES PATENTS

Re. 26,316	12/1967	Horwitt	219—265
2,704,318	3/1955	Jorgensen et al.	219—264
2,778,915	1/1957	Jorgensen	219—270
3,238,353	3/1966	Lybrook	219—265
3,330,937	7/1967	Horwatt	219—265

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