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CONTACT ASSEMBLY FOR LIGHTER

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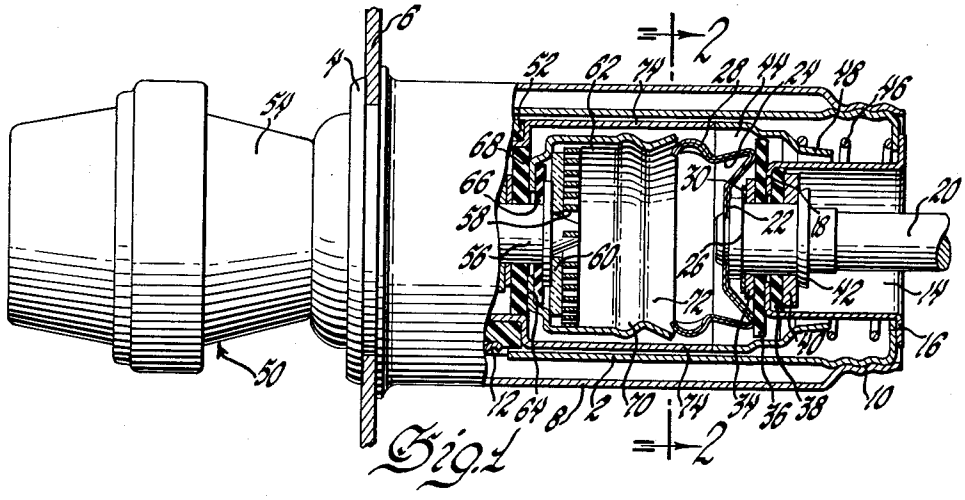


Fig. 1

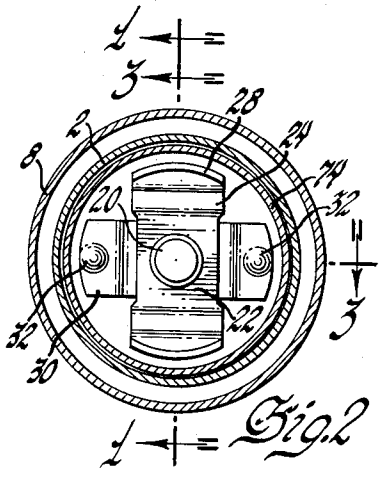


Fig. 2

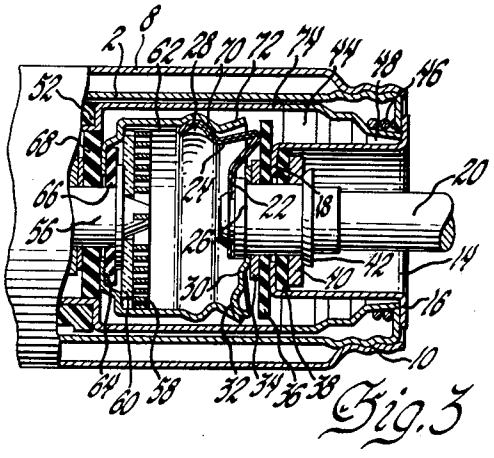


Fig. 3

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CONTACT ASSEMBLY FOR LIGHTER

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The present invention relates to electric cigar or cigarette lighters and, in particular, to a contact assembly therefor.

Electric lighters of the type commonly in use today with automotive vehicles typically comprise a tubular or cylindrical holding case or shell having a deep well or cavity within which an igniting unit is removably insertable. The igniting unit and holding case includes, respectively, movable and fixed latching contact members through which an electrical circuit may be established to bring the heating element of the igniting unit to a substantially predetermined temperature for use. The fixed contact member mounted within the holding case usually takes the form of a plurality of bimetallic temperature responsive contact fingers which will latchingly engage the movable contact of the removable igniting unit to maintain the assembly in a circuit closing position during the heating cycle, while being automatically releasable upon the desired heating element temperature being reached. Usually, a suitable ejection means is provided to eject the igniting unit automatically to a holding position within the case for subsequent removal and use after the element has been heated.

As is well known to those acquainted with this art, currents as high as approximately 20 amperes are conducted through the fixed and movable contact members of the aforedescribed lighters. In order to safely conduct such high currents, the respective contact members are fabricated to have as large a contact area as possible, and at least the movable contact member associated with the removable igniting unit is often plated with silver or another suitable metal to increase its conductivity. Moreover, in order to prevent severe arcing between the contacts upon release thereof, it will be apparent that the automatic ejection action of the igniting unit should be quite rapid. Even less severe arcing, occurring to some extent during each cycle of operation, may progressively burn the engageable areas of the contact members thereby burning away the conductive plating which may have been provided thereon, and roughening the contact areas. As a consequence of the aforementioned arcing during repeated cycles of lighter use, the engageable contacts may begin to stick thereby slowing the ejection action of the igniter unit while allowing the relatively high currents to continue to pass through the contact members resulting in severe arcing which reduces the service life of the lighter or even results in dangerous fires.

As aforementioned, the heating element of the igniting unit is usually raised to the desired temperature by closing a circuit through the movable contact member carried by the igniting unit upon latching engagement of the latter with the automatically releasable temperature responsive contact fingers in the holding case. However, it occurs that the igniting unit is for some reason not removed for use while the heating element thereof is still hot, although the contact fingers may not have cooled sufficiently to be in a cooperating contact engaging position. In these circumstances, the operator may thrust the igniting unit back into the holding case to obtain a "re-light" but, because the temperature responsive contact fingers are still warm, the latter are unable to latchingly engage the igniting unit contact member in a circuit closing position. Therefore, it is desirable to provide a secondary or "re-light" contact member for establishing the desired igniting circuit under the above circumstances.

However, the construction and cooperable functional engagement of such a secondary contact member with the movable contact member of the igniting unit must be such as not to contribute to the roughening of engageable contact areas in order to prevent the aforementioned severe arcing and the consequences thereof. Thus, since such a secondary contact member may be conveniently located adjacent the primary contact fingers so as to be engaged each time the latter are engaged, the secondary contact should be so constructed as not to roughen, gouge or abrade the movable contact member carried by the igniting unit. Of course, such a situation is likewise to be avoided when intentionally using the secondary contact for "re-light" purposes. Such abrading or gouging action would tend to wear off the highly conductive coating or plating on the movable contact member of the igniting unit, while roughening the movable contact surface itself. Inasmuch as the igniting unit is placed in many different rotational positions within the holding case during use, such a roughened movable contact area would eventually come into repeated contact with the contact area of the primary temperature responsive contact fingers thereby abrading and roughening the latter. As a result, even though the heating element of the igniting unit would reach the desired temperature, the igniting unit would tend to stick within its holding case thereby resulting in the severe arcing and reduced service life, and potential danger of serious fires as aforementioned.

It is, therefore, a principal object of this invention to provide an electric lighter contact assembly which will result in rapid circuit breaking ejection of the lighter igniting unit throughout a prolonged service life.

It is another object of this invention to provide an electric lighter contact assembly comprising a fixed primary contact member and a fixed secondary or "re-light" contact member cooperable in such a manner with the movable contact member on the removable igniting unit as to prevent harmful sticking of the lighter igniting unit in its holding case upon the lighter heating element reaching the desired temperature, thereby avoiding severe arcing between engaged contacts and prolonging the service life of the lighter.

It is yet another object and feature of this invention to provide a contact assembly of the type aforementioned for the holding case of an electric lighter in which the secondary or "re-light" contact member is made of a flexible or yieldable material which will move upon engagement with the movable contact member of the igniting unit thereby preventing abrasion and roughening of the latter.

In general, these and other objects of this invention are attained in an electric lighter contact assembly comprising a primary contact member fixed to the lighter holding case and including temperature responsive fingers normally employed to latchingly engage the movable contact member of an igniting unit for conducting a heating current to the lighter heating element, and a secondary yieldable contact member axially spaced from the primary contact member and fixed within the holding case for engagement with the movable contact member for "re-light" purposes. Upon engagement of the igniting unit contact member with the "re-light" or secondary contact member, the latter may yield to prevent abrading or gouging the igniting unit contact member. Inasmuch as the movable igniting unit contact member is not so roughened, it is readily disengaged from the primary contact fingers throughout the service life of the lighter.

The structure and function of the improved lighter of this invention will become more apparent hereinafter as

the description of the invention proceeds, and in which reference is made to the following drawings in which:

FIGURE 1 illustrates a lighter assembly with the components thereof in a circuit open storage position, and is a partial section taken on line 1—1 of FIGURE 2;

FIGURE 2 is a section taken on line 2—2 of FIGURE 1; and

FIGURE 3 is a fragmentary section taken on line 3—3 of FIGURE 2 illustrating the components of the lighter assembly in a circuit closing position.

Referring now to the drawings, there is shown a substantially tubular or cylindrical holding case or shell 2 having a radial flange 4 at its open end adapted for abutment with a support panel 6 which may be the instrument panel of an automotive vehicle. The flange 4 is held in abutment with the panel 6 to support the holding case in the position shown in the drawings by means of a locking sleeve 8 threadably engaging the rearward or inner end of the holding case as at 10 and abutting panel 6. A plurality of spaced yieldable spring fingers 12 are lanced from or otherwise provided in the side wall of the holding case 2 so as to cooperate with the igniting unit or plug to be described to maintain the latter in a circuit open holding or storage position within the holding case.

The base or inner end of the holding case 2 is closed by a substantially tubular sleeve 14 having a rearward annular radial flange 16 suitably secured to the holding case as by welding. At its forward or axially outward end, the tubular sleeve 14 is provided with an annular radial wall 18 having an aperture therein through which the metallic mounting stud 20 extends in spaced relationship thereto.

The central portion of a metallic primary contact member 22, herein shown to include a pair of oppositely radially projecting bimetallic temperature responsive fingers 24 is riveted or otherwise suitably fixedly secured to the head of stud 20 against the radial shoulder 26 thereon. Each of the fingers 24 includes a radially outwardly projecting curved contact surface 28 for engagement with a movable contact member on the igniting unit to be described. The metallic "re-light" or secondary contact member 30 is suitably apertured so as to be fixedly supported on and in contact with the mounting stud 20 axially inwardly of the primary contact member 22, and in abutment with the shoulder 26 of the mounting stud. The secondary contact member 30 is formed of a strip of yieldable material disposed substantially at right angles to the primary contact fingers 24, and includes axially oppositely disposed radially projecting curved contact surfaces 32. As appears clearly from the drawings, the respective contact surfaces of the primary and secondary contact members extend radially within the holding case 2 to a sufficient extent so as to cooperate with the movable contact on the igniting unit in a manner to be described.

In completing the mounting of the contact assembly on the mounting stud 20, an annular washer 34 and a relatively large annular insulating washer 36 are supported on the mounting stud 20, with the insulating washer in abutting contact with the wall 18 of the tubular sleeve 14. An additional annular insulating washer 38 is supported on stud 20 and nested within sleeve 14 against the interior face of the sleeve wall 18, and the washer 40 abuts washer 38 and shoulder 42 axially inwardly of the mounting stud 20.

An ejection sleeve 44 is telescopically mounted within the holding case 2 about sleeve 14, and includes a shoulder normally urged into abutting stop engagement with the periphery of the insulating or stop washer 36 as shown in FIGURE 1 by means of an axially coiled spring 46 acting between the axially rearwardly extending skirt 48 of the ejection sleeve and the rear wall

or base of the holding case 2. Axial inward movement of ejection sleeve 44 is limited by abutment of skirt 48 with the base of the holding case as shown in FIGURE 3.

The igniting unit 50 may be seen to include a main body portion 52 to which the handling knob 54 is secured. Similarly, a metallic mounting stud 56 is secured to the igniting unit at the insertable end of the latter. A heating element 58 formed of continuous coils of ribbon-like resistance stock is mounted on the end of stud 56 adjacent a suitable insulating washer 60 abutting a shoulder on the stud. One end of the heating element is staked or otherwise electrically connected to stud 56, while the other end is similarly connected to a tubular contact cup 62 which surrounds and extends axially an appreciable distance beyond element 58. The contact cup 62 includes an apertured base wall 64 surrounding stud 56 and mounted between insulating washers 66 and 68 carried by the stud. The open end of the contact cup 62 terminates in a radially inwardly directed annular depression or ridge defining the contact surface 70 spaced from the axially and radially outwardly flaring mouth 72. Surrounding and spaced from the contact cup 62 is an outer sleeve 74 suitably secured to the main body portion 52 of the igniting unit, and extending beyond the contact cup 62 and heating element 58.

It will be understood that the mounting stud 20 in the holding case forms a terminal adapted to be connected to a suitable electrical power source such as a vehicle battery. Current from such a power source is conducted through the mounting stud 20 to the primary contact member 22 and secondary contact member 30. With the igniting unit contact cup 62 in engagement with one or the other of the contact members of the holding case, it will be understood that a circuit is established through the contact cup 62, heating element 58 and stud 56 to ground in the usual manner.

Normally, the igniting unit 50 will be maintained in a storage or holding position within the holding case 2 as indicated in FIGURE 1 by resilient fingers 12, with the movable contact cup 62 out of circuit closing engagement with either of the contact members of the holding case. If it is desired to heat the element 58, the igniting unit is thrust manually axially inwardly of the holding case 2 to the position shown in FIGURE 3. During this action, the contact surfaces 28 of the bimetallic primary contact fingers ride radially inwardly over the flared mouth 72 of the contact cup 62 past the radial ridge therein into latching engagement with the cup contact surface 70. Simultaneously, spring 46 is compressed by ejection cup 44 which is engaged by sleeve 74. The circuit is then closed thereby conducting current through the heating element 58 until such time as it reaches a predetermined temperature for use. The bimetallic fingers 24, responding to this temperature, move radially inwardly thereby unlatching and automatically releasing the igniting unit which is then ejected to the holding position of FIGURE 1 by the ejection cup 44. The igniting unit may then be removed for use. If the igniting unit should be thrust too forcibly axially inwardly so that the flared mouth 72 of contact cup 62 strikes the contact surfaces 32 of the secondary contact member 30, the latter will yield axially and somewhat radially inwardly while riding into the contact cup. As a consequence, smooth contact engagement results thereby preventing abrading or gouging of the mouth of the contact cup. Inasmuch as the secondary contact member 30 is yieldable, the skirt 48 of the ejection cup is relatively long so as to abut the base of the holding case to prevent further axial inward movement of the igniting unit upon engagement of the secondary contact member 30 with the contact cup 62.

The function of the aforedescribed assembly is substantially identical in a situation in which the igniting unit is to be "re-lighted." In such a situation in which the bimetallic fingers 24 have not cooled sufficiently so

as to latch upon the cup **62**, the igniting unit is manually held in a circuit closing position with the secondary contact member **30** in engagement with the contact cup **62** for a sufficient period to enable the heating element to reach the proper temperature. Thereafter, the igniting unit is removed manually for use. Again, the smooth engagement between the secondary contact member **30** and the contact cup **62** prevents abrading or gouging of the latter, while the ejection cup skirt **48** acts as a stop limiting axial inward movement of the igniting unit upon engagement with the secondary contact member. Moreover, the yieldable action of secondary contact **30** compensates for any axial misalignment between the latter and contact cup **62**. As a result of the above, the mouth **72** of the contact cup **62** remains relatively smooth and will not roughen the contact surfaces **28** of the bimetallic fingers **24**. Accordingly, these contacts will not tend to adhere after the heating element is raised to the desired temperature, thereby permitting rapid ejection action to break the relatively high heating currents passing through the assembly. As a result, severe arcing is substantially reduced if not eliminated while the danger of fires is avoided, thereby contributing to a prolonged service life.

Having disclosed a preferred embodiment of the invention by way of illustration, it is to be understood that the invention is not to be limited thereby but only by the claims which follow.

I claim:

1. A holding case adapted to removably receive the igniting unit of an electric lighter, a contact assembly mounted within said case and connectible with a source of electric power for establishing a closed heating circuit through said igniting unit upon engagement with the latter, said contact assembly comprising a primary contact member engageable with said igniting unit upon insertion of the latter within said holding case to a predetermined extent, and a secondary flexibly yieldable contact member engageable with said igniting unit upon insertion of the latter within said holding case beyond said predetermined extent.

2. A holding case adapted to removably receive the igniting unit of an electric lighter, a contact assembly mounted within said case and connectible with a source of electric power for establishing a closed heating circuit through said igniting unit upon engagement with the latter, said contact assembly comprising a primary contact member engageable with said igniting unit upon insertion of the latter within said holding case to a predetermined extent, a secondary yieldable contact member engageable with said igniting unit upon insertion of the latter within said holding case beyond said predetermined extent, and stop means limiting insertion of said igniting unit upon engagement of the latter with said secondary contact member.

3. A holding case adapted to axially removably receive the igniting unit of an electric lighter, a contact assembly mounted within said case and connectible with a source of electric power for establishing a closed heating circuit through said igniting unit upon engagement with the latter, said contact assembly comprising a primary contact member engageable with said igniting unit upon axial insertion of the latter within said holding case to a predetermined extent, a secondary axially yieldable contact member engageable with said igniting unit upon axial insertion of the latter within said holding case beyond said predetermined extent, and stop means within said holding case limiting axial insertion of said igniting unit upon engagement of the latter with said secondary contact member.

4. A holding case adapted to axially removably receive the igniting unit of an electric lighter, a contact assembly mounted within said case and connectible with a source of electric power for establishing a closed heating circuit through said igniting unit upon engagement

with the latter, said contact assembly comprising a primary contact member engageable with said igniting unit upon axial insertion of the latter within said holding case to a predetermined extent, a secondary axially and radially yieldable contact member engageable with said igniting unit upon axial insertion of the latter within said holding case beyond said predetermined extent, and stop means within said holding case limiting axial insertion of said igniting unit upon engagement of the latter with said secondary contact member.

5. A holding case adapted to removably receive an electric lighter igniting unit including a contact member at the insertable end thereof, a contact assembly mounted within said holding case and connectible with a source of electric power for establishing a heating circuit through said igniting unit upon engagement with said igniting unit contact member, said contact assembly comprising a primary contact member latchingly engageable with said igniting unit contact member upon insertion of the latter within said holding case to a predetermined extent to retain said igniting unit in a circuit-closing position, and being automatically releasable to a circuit-opening position upon said igniting unit reaching a predetermined temperature, and a secondary flexibly yieldable contact member engageable with said igniting unit contact member upon insertion of the latter within said holding case beyond said predetermined extent.

6. A holding case adapted to removably receive an electric lighter igniting unit including a contact member at the insertable end thereof, a contact assembly mounted within said holding case and connectible with a source of electric power for establishing a heating circuit through said igniting unit upon engagement with said igniting unit contact member, said contact assembly comprising a primary contact member latchingly engageable with said igniting unit contact member upon insertion of the latter within said holding case to a predetermined extent to retain said igniting unit in a circuit-closing position, and being automatically releasable to a circuit-opening position upon said igniting unit reaching a predetermined temperature, a secondary yieldable contact member engageable with said igniting unit contact member upon insertion of the latter within said holding case beyond said predetermined extent, and a spring-biased ejection means engageable with said igniting unit and abuttable within said holding case to limit insertion movement of said igniting unit contact member upon engagement of the latter with said secondary contact member.

7. A holding case adapted to axially removably receive an electric lighter igniting unit including a contact member at the insertable end thereof, a contact assembly mounted within said holding case and connectible with a source of electric power for establishing a heating circuit through said igniting unit upon engagement with said igniting unit contact member, said contact assembly comprising a primary temperature responsive contact member latchingly engageable with said igniting unit contact member upon axial insertion of the latter within said holding case to a predetermined extent to retain said igniting unit in a circuit-closing position, and being automatically releasable to a circuit-opening position upon said igniting unit reaching a predetermined temperature, a secondary axially and radially yieldable contact member engageable with said igniting unit contact member upon axial insertion of the latter within said holding case beyond said predetermined extent, and a spring-biased ejection means engageable with said igniting unit and abuttable within said holding case to limit axial inward movement of said igniting unit contact member upon engagement of the latter with said secondary contact member.

8. A holding case adapted to axially removably receive the igniting unit of an electric cigarette lighter, a contact assembly mounted within said case and connectible with a source of electric power for establishing an ig-

niting circuit through said igniting unit upon engagement with the latter, said contact assembly comprising axially spaced primary and secondary contact members sequentially engageable respectively with said igniting unit upon axial insertion of the latter within said holding case to and beyond a predetermined extent, said secondary contact member being flexibly yieldable upon engagement with said igniting unit.

9. A cigar lighter assembly comprising a holding case, an igniting unit removably insertable within said holding case, a heating element secured to said igniting unit at the insertable end thereof, a contact cup fixed to said igniting unit and electrically connected to said heating element, said cup surrounding and extending axially beyond said heating element, a mounting stud secured in the base of said holding case and adapted to be connected to a source of electric power, contact fingers fixed to said stud within said case, said fingers extending into latching circuit closing engagement with said contact cup upon inserting said igniting unit into said holding case to a predetermined extent, and a secondary flexibly yieldable contact member fixed to said stud axially inwardly of said case from said contact fingers and extending radially into the path of axial travel of said contact cup for engagement with the latter upon insertion of said igniting unit beyond said predetermined extent.

10. A cigar lighter assembly comprising a holding case, an igniting unit removably insertable within said holding case, a heating element secured to said igniting unit at the insertable end thereof, a contact cup fixed to said igniting unit and electrically connected to said heating element, said cup surrounding and extending axially beyond said heating element, a mounting stud secured in the base of said holding case and adapted to be connected to a source of electric power, temperature responsive contact fingers fixed to said stud within said case, said fingers extending into said contact cup in latching circuit closing engagement with the latter upon inserting said igniting unit into said holding case to a predetermined extent, a flexible secondary contact member fixed to said stud axially inwardly of said case from said contact fingers and extending radially into the path of axial travel of said contact cup for axially and radially yieldable engagement within the latter upon insertion of said igniting unit beyond said predetermined extent, and a spring-biased ejection sleeve engageable with said igniting unit and abuttable with said holding case to limit axial inward travel of said contact cup upon engagement of the latter with said secondary contact member.

11. A lighter assembly comprising a holding unit, an igniting unit removably insertable therein, engageable primary contact means carried respectively by said igniting and holding units for establishing an igniting circuit upon insertion of said igniting unit into said holding unit to a predetermined extent, and flexibly yieldable secondary contact means carried by one of said units axially spaced from said primary contact means thereon, said secondary contact means being engageable with the primary contact means carried by the other of said units upon insertion of said igniting unit into said holding unit beyond said predetermined extent.

12. A holding case adapted to removably receive the igniting unit of an electric lighter, a contact assembly mounted within said case and connectible with a source of electric power for establishing a closed heating circuit through said igniting unit upon engagement with the latter, said contact assembly comprising a primary contact member engageable with said igniting unit upon insertion of the latter into said holding case to a predetermined extent, and a secondary axially flexibly yieldable contact member engageable with said igniting unit upon insertion of the latter into said holding case beyond said predetermined extent.

13. A holding case adapted to removably receive the igniting unit of an electric lighter, a contact assembly mounted within said case and connectible with a source of electric power for establishing a closed heating circuit through said igniting unit upon engagement with the latter, said contact assembly comprising a primary contact member engageable with said igniting unit upon insertion of the latter into said holding case to a predetermined extent, and a secondary radially flexibly yieldable contact member engageable with said igniting unit upon insertion of the latter into said holding case beyond said predetermined extent.

14. A holding case adapted to removably receive the igniting unit of an electric lighter, a contact assembly mounted within said case and connectible with a source of electric power for establishing a closed heating circuit through said igniting unit upon engagement with the latter, said contact assembly comprising a primary contact member engageable with said igniting unit upon insertion of the latter into said holding case to a predetermined extent, and a secondary axially and radially flexibly yieldable contact member engageable with said igniting unit upon insertion of the latter into said holding case beyond said predetermined extent.

15. A holding case adapted to removably receive the igniting unit of an electric lighter, a contact assembly mounted within said case and connectible with a source of electric power for establishing a closed heating circuit through said igniting unit upon engagement with the latter, said contact assembly comprising a primary contact member engageable with said igniting unit upon insertion of the latter into said holding case to a predetermined extent, and a secondary yieldable contact member engageable with said igniting unit upon insertion of the latter into said holding case beyond said predetermined extent, and stop means limiting insertion of said igniting unit upon engagement of the latter with said secondary contact member.

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