Dec. 3, 1940. P. E. ASHTON 2,223,654

ELECTRIC CIGAR LIGHTER

Filed Aug. 24, 1937

Fig. 1.

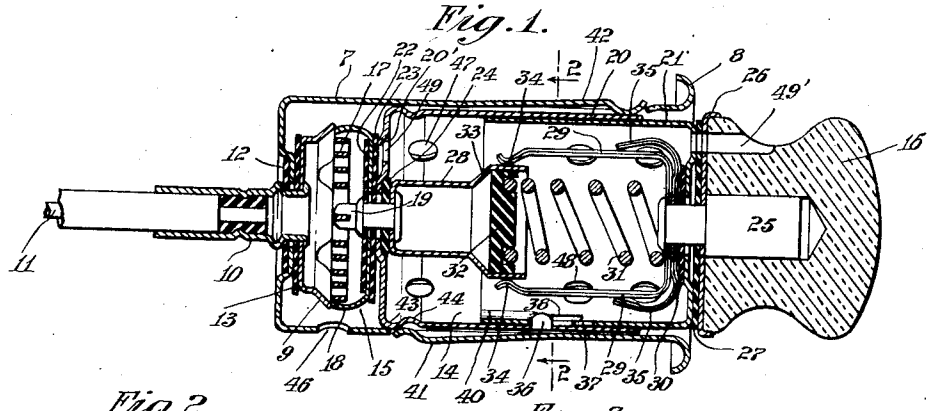


Fig. 2.

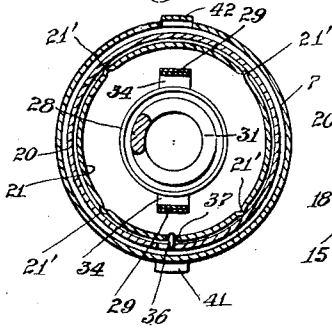


Fig. 3.

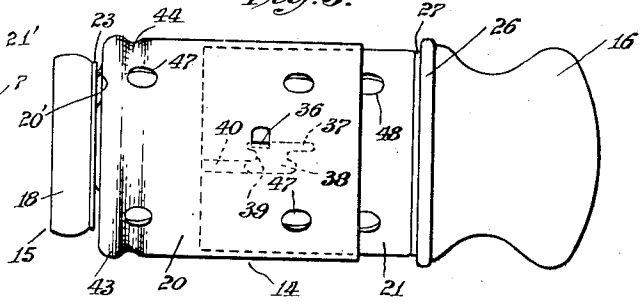


Fig. 4.

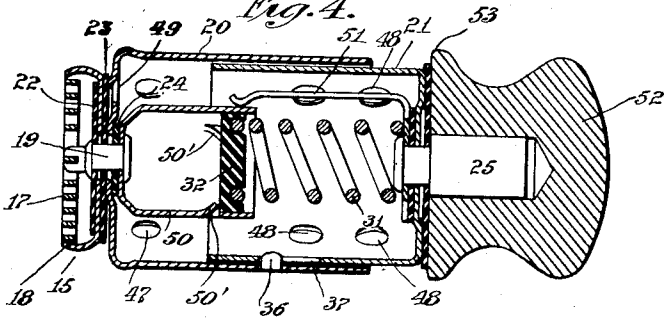
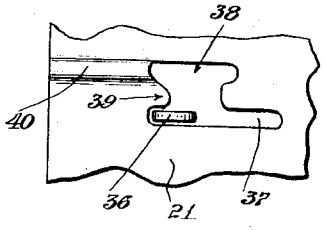


Fig. 5.



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ELECTRIC CIGAR LIGHTER

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15 Claims. (Cl. 219—32)

This invention relates especially to lighters of the so-called "cordless" type having stationary sockets and removable plugs.

One object is to provide a lighter which is simple, durable and inexpensive.

Another object is to provide a plug which is light but strong and suitable for use on motor cars, boats and aeroplanes.

Another object is to provide a structure in which the circuit may be closed when desired and held closed until opened automatically after the igniter has had time enough to become incandescent.

Another object is to provide a device in which all the make and break contact surfaces are exposed and may be inspected when the plug is removed from the socket i. e. I omit all concealed switch contacts.

Another object is to provide an automatic release which is independent of the igniter element and operates independently of the temperature of the igniter element.

Another object is to provide a device in which a spring opens the circuit by moving the knob and a knob carrying member while leaving the heating unit and a major portion of the plug stationary.

A further object is to provide a simple and inexpensive construction by attaching the conventional heating element and element contact cup directly and permanently to the plug without employing the customary screw threaded heating unit base member.

Fig. 1 is a longitudinal sectional view of a lighter involving one form of our invention, the plug being shown in the socket but with the parts in the open circuit position and showing a latch and thermostatic release.

Fig. 2 is a transverse sectional view on the plane of the line 2—2 of Fig. 1.

Fig. 3 is a side view of the removable or plug member of Figs. 1 and 2.

Fig. 4 is a side view and longitudinal section showing a modification having no automatic latch and no auto release.

Fig. 5 is an enlarged detail view showing one form of interlock between the two parts of the plug body.

The socket member has a tubular portion 7 adapted to be secured in any suitable manner to a support such as the instrument board of a car. This tubular portion is preferably of metal and constitutes the "grounded" side or terminal of the electric circuit and has a flange 8 around the front or open end for abutment against the front face of the instrument board. In the rear of the socket is the stationary contact 9 with flaring rim or fingers, preferably resilient. This contact terminal 9 is connected to the other side of the electric circuit by the metal tube 10 and conductor 11. Of course the terminals 7 and 9 are insulated from each other suitably for instance by insulating washers 12 and 13.

The plug member has a tubular metallic body 14 which carries the igniter unit 15 at its rear end and has a suitably shaped knob or handle 16 at its front end.

The igniter unit preferably consists of a spiral ribbon 17 of resistance metal having its outer end welded inside of the metal cup 18 and its inner end bent diametrically and held in a slot in the stud or rivet 19. The cup 18 forms a plug contact and its rear edge or rim is preferably curled or turned inwardly so as to provide an inclined or bevelled edge for engaging the flaring portion of the socket terminal 9.

The body 14 of the plug is formed of two cylindrical shells or cup-like members 20 and 21 one of which telescopes with the other. One of these may have a number of small flutes or ribs 21' so as to reduce the area of contact between the parts 20 and 21. The two members 20 and 21 carry respectively the igniter unit and the knob and may, if desirable, be made easily separable so as to facilitate inspection and repair as will be later described.

The igniter unit 15 is carried by the cup member 20 being secured thereto by rivet 19 but insulated therefrom by washers 22, 23 and 24. Small lugs or tongues 20' formed or struck from the end of member 20 and insulated from the bottom of cup 18 by washer 23 serve to assist in holding the igniter unit. This method of supporting the igniter unit avoids the necessity of the customary screw threaded mounting and results in economy of material and manufacturing and assembly cost.

The rivet or support 25 secures contact disc 26, resilient bimetallic thermostatic latch 29 and cup 21 together but cup 21 is insulated from these associated parts by insulating washers 27 and 30. The knob 16 may be made of insulating or other material and is firmly attached to rivet 25 by any convenient means such as being cemented, screwed, pressed or molded thereon. The disc 26 is larger in diameter than the cylindrical part of cup 20 but not too large to enter socket tube 7 so that when the knob is pressed toward 7 the disc will engage the inner surface of the tube with a wiping contact.

Inside of the tubular or hollow body 14 of the plug are members which provide sliding electrical connections at all times between the stud 19 and the support 25. These sliding members consist of a metallic cup-like abutment shell 28 and a resilient bimetallic thermostatic latch 29. Shell 28 is secured to the cup member 20 by means of the riveted stud 19 but insulated from it by washer 24. A spring 31 is interposed between the two telescoping cup members 20 and 21 being located between the base of the latch 29 and the mouth of the shell 28. An insulating member 32 is interposed between the shell 28 and the spring 31 so as to prevent heat that might be generated by current passing therethrough damaging the spring temper and also to arrest heat which might be conducted from igniter coil 17 by associated parts 19 and 28. The abutment formed by the inclined part 33 of shell 28 supports the insulator 32 against the pressure of spring 31.

The washer 24 may also be of suitable thermal insulating material to minimize heat conduction to the latch 29. The two fingers of the latch 29 are biased toward each other and press against the outer wall of the shell 28. This shell has an inclined shoulder 33 adapted to receive and hold the inclined tips 34 of the latch fingers when the latch is pressed inwardly to a sufficient extent. The biasing strength of the latch fingers is sufficient to overcome the strength of the spring 31 under normal temperature conditions.

The electrical resistance and mechanical proportions of the latch fingers however are selected or designed so that the passage of the igniting current for a predetermined time interval will warp or expand the fingers sufficiently to permit the spring 31 to overcome the holding power of the tips 34 on the incline 33. As such devices must necessarily operate on a rather small temperature differential, compensating means may be provided when the temperature under the cowl of the car varies greatly. This may consist of a supplementary thermostatic member 35 serving as a compensator. This has its characteristics so designed as to tend to contract and grip the latch fingers 29 as the temperature of the air rises and thus offset the tendency of the fingers to expand due to this increase in air temperature which of course would cause the release of the latch before the time required for heating the igniter coil.

If necessary the two members 29 and 35 may be thermally and electrically insulated from each other so that the passage of current will not effect the compensator 35. The desirability of such a compensator will be appreciated when it is realized that the temperature adjacent the socket may vary from 40° below zero F. to even as high as 125 or 130° F. in various places and seasons. The compensator construction will be claimed in another application.

The spring 31 tends to press the cups 20 and 21 apart but separation is prevented by a lug 36 on part 20 which extends into a slot 37 in part 21. This slot may have a side extension 38 which is shorter than slot 37. Lug 39 normally prevents the cup 21 from being rotated in cup 20, but by pressing the cup 21 inwardly sufficiently the lug 36 will be free of lug 39 in which position cup 21 may be turned with respect to cup 20 so that lug 36 passes into the extension slot 38. In this position, it will be impossible to close the circuit as the slot 38 is too short to permit the cup 21 and the attached contact disc 26 to be pressed in sufficiently for the disc to contact with the grounded socket tube 7. This constitutes means for disabling the igniter against accidental operations or when it is not desired to have it used by an unauthorized person. When the disabling action is not required the slot extension 38 may be omitted. A plurality of these lugs and slots may be provided if desired.

A groove or slot 40 in the edge of the cup 21 may provide clearance for the lug 36 so that the cup 21 may be readily withdrawn from the cup 20. In this way, the latch parts and spring may be readily inspected, adjusted, repaired or replaced.

A number of spring fingers 41 and 42 may be provided integral with tube 7 to frictionally hold the plug in the socket. Preferably the cup-like member 20 has a bead 43 slightly larger than the cylindrical portion of member 20 and which fits loosely in the socket tube 7 and serves to guide the igniter element to its seat on the stationary contact 9.

A groove 44 is also preferably provided in the plug member, into which the inclined tip of the spring finger 41 is biased so as to tend to hold the plug in the socket with the rim of the igniter element always pressed into contact with the terminal 9 except when withdrawing the plug from the socket.

In case the knob 16 is of metal, its base would perform the function of the contact disc 26 (see Fig. 4) and an integral part thereof may replace rivet 25.

The socket may be provided with holes such as 46 for ventilation and also to discharge dust and ashes. The body of the plug member is also preferably provided with ventilating holes or passages such as 47, 48.

Although the form just described is intended for automatic release so as to eliminate the necessity of observation by the operator, I may provide observation openings such as 49, 49' in the opaque portions. If, however, the knob is translucent these openings need not be carried therethrough.

From the foregoing, it will be seen that when the plug is in the socket in its normally unenergized position, the contact 18 of the plug is held in electrical engagement with the circuit terminal 9 by means of the spring finger 41. The other contact 26 of the plug is held out of engagement with the circuit terminal 7 by the pressure of the spring 31. When the knob is pressed inwardly so as to slide the body part 21 into part 20 and compress the spring 31, the contact 26 enters the outer end of the socket tube 7 and completes the circuit from the igniter 15 through resistance 17, stud 19, shell 28, thermostatic latch 29 and stud 25 to contact 26. At the same time, the latch tips 34 have interlocked with the abutting incline 33 to hold the parts of the plug in the closed circuit position.

The passage of current through the igniter causes it to become incandescent by reason of its resistance characteristic. At the same time, the heat generated by the passage of current through the thermostatic latch 29 causes it to warp so as to retract the latch and permit the spring 31 to snap the outer end of the plug outwardly and break the switch connection between 8 and 26, but still leaving the contact 18 in engagement with the terminal 9. This snapping of the plug part 21 and knob 16 to the open circuit position can be heard and also observed visually.

As the spring 31 only has to overcome the fric-

tion of the disc 26 in the tube 7, the friction of the shell 21 in shell 20 and the friction of the thermostatic fingers on the abutment 23, it need not be made as powerful as it would be if it were necessary to move the igniter unit and its supporting shell 20. There is also much less likelihood of the parts sticking and burning out in case the spring should become weakened and unable to overcome the greater friction.

The form of plug shown in Fig. 4 may be used in the same socket as that above described, but has no automatic latch or release. Its construction is similar to that of the plug of Figs. 1 to 3 but the contact disc 53 is made slightly larger in diameter than the inside of the socket tube 7 so that when the lighter is used the disc is arrested at the mouth of the socket and so prevents undue manual pressure being placed on terminal 9.

The shell 50 is secured to the igniter stud 19. The spring finger 51 is secured to the stud 25 and biased against the outer wall of the shell 50.

The spring 31 is compressed between the stud 25 and the thermal insulator 32 in the shell 50. The lugs 50' struck inward from the wall of the shell 50 support the insulator 32. The knob 52 in this case is of metal and its outer edge 53 is large enough to take the place of disc 26 of Fig. 1 to serve as one of the contacts of the plug. The circuit is completed by pushing the plug into a socket until the contact 18 at its inner end engages the bottom spring terminal of the socket and then continuing the pressure on the knob until the rim of the knob (or contact) engages the outer end of the grounded tube of the socket.

The socket contacts are each shown having outwardly inclined portions and the cooperative plug contacts are fixed to the portion of the plug body on which they are mounted. One advantage of such a construction is that each of the stationary or socket contacts is enabled to function in guiding or centering its cooperative plug contact and the portion of the plug body carrying such contact.

I claim:

1. An electric cigar lighter comprising a socket having a contact at its outer end and another contact in its inner end, a plug member having a body with an igniter element at its inner end with a contact to engage the inner contact of the socket and a knob at its outer end with a contact to engage the outer contact of the socket, a thermostatic latch member and an abutment within the plug body electrically connected respectively with the knob contact and the igniter contact, said body having telescoping parts and a spring tending to separate them, said latch and abutment interlocking to hold the parts in closed circuit relation when the knob is pressed inwardly, said latch being released automatically when heated so that the spring can move the part of the plug body with the knob contact to open the circuit.

2. An electric cigar lighter comprising a socket open at one end and having a contact at the mouth of the socket and an interior contact, a plug formed of two parts slidable relative to each other, an igniter carried by the inner end of one part and having a contact to engage the interior contact of the socket, a contact carried by the outer end of the other part for engagement with the contact at the mouth of the socket, a spring normally biasing one part of the plug relative to the other part, a thermostatic member carried by one part of the plug and a cooperating abutment contact carried by the other part of the plug.

3. An electric cigar lighter comprising a socket having a contact at its outer end and another contact in its inner end, a plug member having a body with an igniter element at its inner end with a contact to engage the inner contact of the socket and a contact to engage the outer contact of the socket, a spring for normally holding the plug in the socket, a thermostatic latch member and an abutment within the plug body electrically connected respectively with the two plug contacts, said body having sliding parts and a spring tending to separate them, said latch and abutment interlocking to hold the parts in closed circuit relation when the outer end of the plug is pressed inwardly, said latch being released automatically after an interval so that the spring can move the outer end of the plug body with its contact to open the circuit.

4. A plug for a cigar lighter comprising two telescoping cup-like body portions, an igniter element carried by but insulated from one body portion and having a contact for engagement with a socket terminal, a stud connected to said igniter element, a knob and contact carried by the other body portion but insulated therefrom, a stud electrically connected to said latter contact, electrical conducting elements within the body portions connected to the respective studs and slidably engaging each other, a spring compressed between said body portions, means for limiting the separation of the body portions and means for disabling said plug to prevent compression of the spring.

5. An electric cigar lighter comprising a socket having an outer contact and an inner contact, a hollow plug member having a body with an igniter element at its inner end with a contact to engage the inner contact of the socket and another contact to engage the outer contact of the socket, a thermostatic latch member and an abutment within the plug body electrically connected respectively with the outer contact and the igniter contact, said body having slidably connected parts, a spring tending to separate them, said latch and abutment interlocking to hold the parts in closed circuit relation when the body is pressed inwardly, said latch being released automatically when heated by the passage of current through it so that the spring can move the part of the plug body with the outer contact to open the circuit.

6. A plug for a cigar lighter comprising two telescoping shells, an igniter element carried by but insulated from one shell and having a contact for engagement with a socket terminal, a stud connected to said igniter element, a knob and contact carried by the other shell, a stud electrically connected to said latter contact, electrical conducting elements within the shell connected to the respective studs and slidably engaging each other, a spring compressed between said shells, means for limiting the separation of the shells and means for disabling the plug and preventing the compression of the spring.

7. An electric cigar lighter comprising a socket open at one end and closed at the other and having two relatively insulated terminals one of which is adjacent the open end of the socket and a plug for removal from and insertion in said socket and including two telescoping cup-like body portions, an igniter element carried by but insulated from one body portion and having a contact for engagement with one of said socket terminals, a stud connected to said igniter element, a knob and external contact adapted to make and break a circuit through said socket and

plug by cooperation with and separation from the terminal adjacent the open end of the socket and carried by the other body portion but insulated therefrom, a stud electrically connected to said external contact, electrical conducting elements within the body portions connected to the respective studs for slidable engagement with each other, a spring compressed between said body portions, means for limiting the separation of the body members, said spring serving to hold said external contact in open circuit relationship to its cooperating socket terminal when the body portions are in their extended position.

8. A cigar lighter comprising a removable plug and a stationary socket for supporting said plug, said plug including a body of oppositely disposed cup-like members telescoping adjacent the socket, one of said telescoping members supporting a heater adjacent one end portion, the other of said telescoping members having a contact at its end away from the heater and fixed with respect thereto, said last mentioned telescoping member being out of direct contact with said socket for a substantial portion of its length, the forward end of said socket having an outwardly inclined portion adapted to engage and assist in centering its cooperative plug contact, said telescoping members being relatively movable for closing and opening a circuit through said heater.

9. A removable plug adapted to be carried by a stationary socket of a cigar lighter of the cordless type, said plug having a heater on one end portion, a body supporting said heater and comprising relatively movable telescoping members constituting the radially outer surface of said plug body, a handle on one of said telescoping members and the heater on the other, a spring cooperating with each of said telescoping members and tending to longitudinally separate them, and a pin and slot connection between said telescoping members for limiting relative longitudinal and angular movement therebetween.

10. A removable plug adapted to be carried by a stationary socket of a cigar lighter of the cordless type, said plug having a heater on one end portion, a body supporting said heater and comprising relatively movable telescoping members constituting the radially outer surface of said plug body, a handle on one of said telescoping members and the heater on the other, a spring cooperating with each of said telescoping members and tending to longitudinally separate them, and a pin and slot connection between said telescoping members for limiting relative longitudinal and angular movement therebetween, said pin and slot connection being constructed to have at least two limiting positions for said members longitudinally of one another.

11. A cigar lighter plug adapted to be inserted and carried in a socket, said plug including relatively longitudinally movable contacts adapted to close a circuit, a spring cooperating with and tending to separate said contacts, a heater carried by said plug and adapted to have its temperature raised on engagement of said circuit closing contacts, thermostatic means for releasing said spring and opening said circuit, an adjustable abutment having at least two positions for limiting the distortion of said spring, when the plug is within a socket, one position for said abutment being such as to preclude operation of said thermostatic releasing means.

12. In a cigar lighter, a removable plug member consisting of two parts, one of which is telescopically and rotatively connected to the other part, an igniter carried by one end portion of one part and a knob carried by the other end portion of the other part, each of the parts having a circuit controlling contact adapted to be moved with respect to the other for the purpose of closing a circuit through the igniter, spring means for normally biasing the parts away from each other, the knob carrying part being adapted to be pressed toward the other part to close the circuit and manually controlled disabling means for limiting the relative movement of the parts so as to prevent the closing of the circuit.

13. A cigar lighter plug member adapted for use in a socket affording current supply terminals, said plug comprising two substantially cylindrical hollow body portions in axially telescopic engagement; said plug having a heater and a first contact therefor at one end, a handle at the other end and a second contact intermediate the handle and first contact and in constant electrically conducting relationship with said first contact through the heater; said second contact extending radially beyond the periphery of the body portion on which it is mounted and being mounted on the portion carrying the handle, a spring carried within the body portions to cause longitudinal extension of the two portions and restraining means carried in part by each portion to limit said extension, a second spring-restraining means also carried in part by each portion and located therein and comprising a bimetallic spring detent and a detent catch member arranged for spring restraining engagement when the plug is telescoped and adapted to be in conducting relationship at all times when within the body portions, said second spring-restraining means forming an extensible conductor between said heater and said second contact and being adapted for automatic release on heating of the heater, said second contact being so located on its body portion as to lie longitudinally outside a socket when said first spring restraining means is actively operative and to lie contiguous and in current transmitting relationship thereto when said second mentioned spring restraining means are operating on said spring.

14. As an article of manufacture, an igniter plug to be used in a socket open at its front end and closed at the rear end and having a contact adjacent the front end and another contact inside the socket adjacent the rear end, said plug comprising two tubular body members, one of which telescopes within the other, a spring tending to separate said members, means for limiting such separation, an igniter element carried by the rear of one body member and having a contact connected thereto and adapted to engage the contact within the socket, a knob secured to the front end of the other body member, a second contact carried by said latter body member adjacent said knob and adapted to engage the contact adjacent the front end of the socket when the plug is inserted in the socket and the knob and the attached body member are moved toward the other body member and the attached igniter element, to compress said spring, a thermostatic arm carried in one body member and electrically connected to the contact carried by said body member and an abutment for the arm carried by the other body member and electrically connected to the contact carried by the latter body member and adapted to be engaged by the said arm when the spring is compressed.

15. In a cigar lighter, the combination of a socket member having two contact portions, and

a plug member adapted to be inserted into and removed from the socket member and having two parts with contact portions longitudinally movable relatively to each other and adapted to engage the respective contact portions of the socket member when the plug member is inserted in the socket member and one plug contact portion has been moved longitudinally with respect to the other contact portion of the plug member, an igniter carried by the plug member and connected electrically to one of the plug contact portions and included in an electric circuit with the other contact portion of the plug member when the contact portions of the plug member engage the respective contact portions of the socket member, means for connecting the two parts of the plug member so that one part may be rotated relative to the other part through less than 360°, and manually operable means for preventing one part from moving longitudinally with respect to the other part sufficiently to permit closing the circuit through the igniter when the parts are in one relative rotated position.

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