

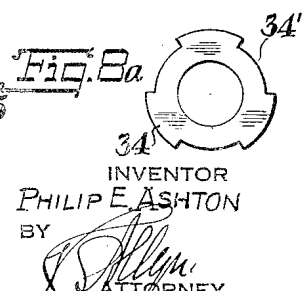
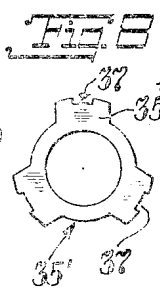
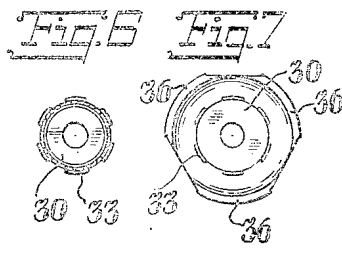
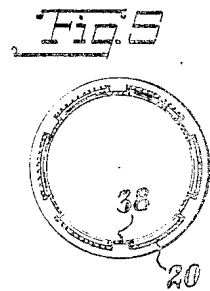
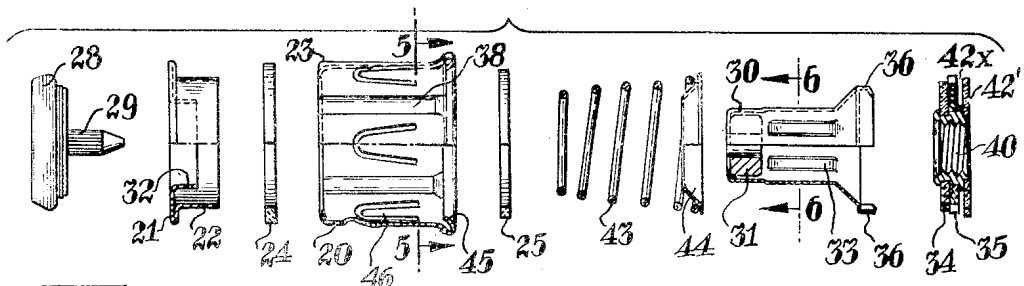
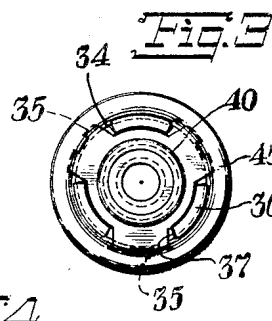
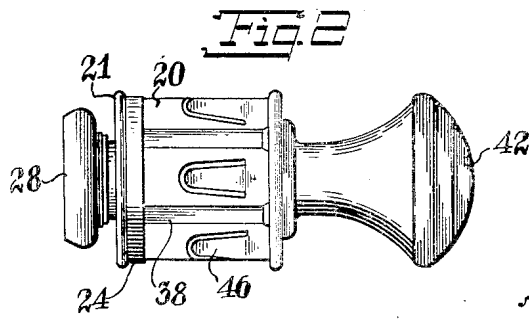
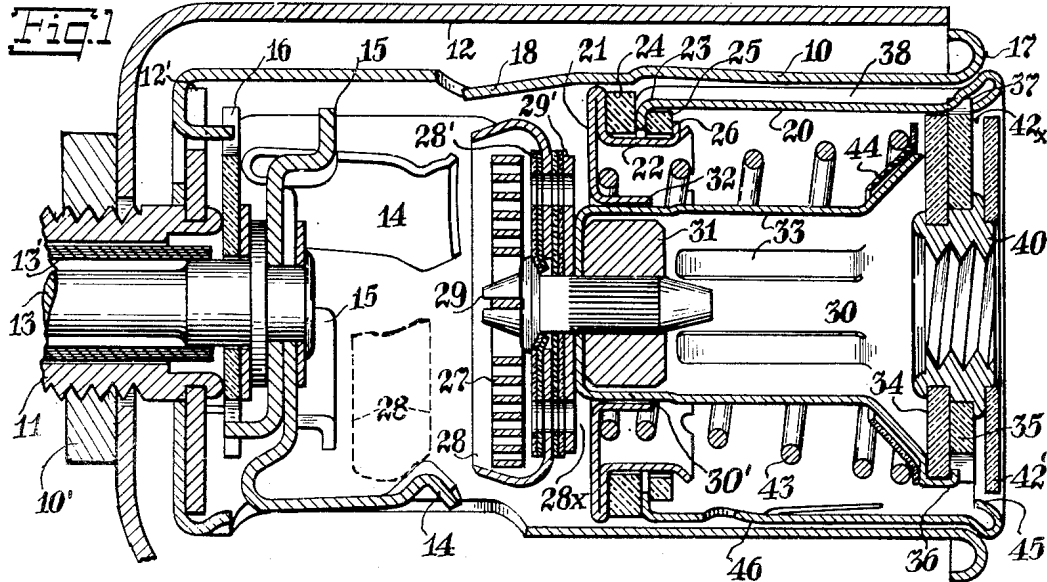
Nov. 28, 1950

P. E. ASHTON  
ELECTRIC CIGAR LIGHTER

2,531,901

Filed July 25, 1946

2 Sheets-Sheet 1



INVENTOR  
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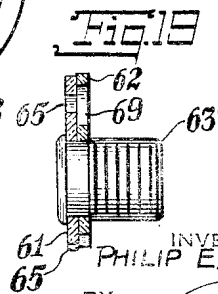
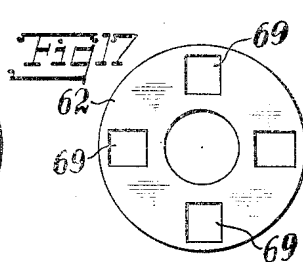
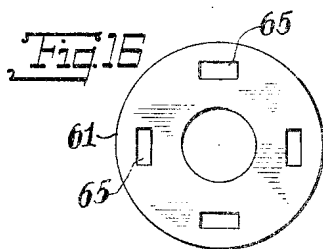
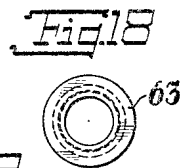
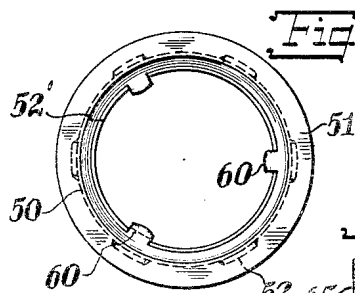
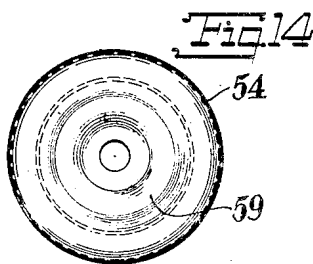
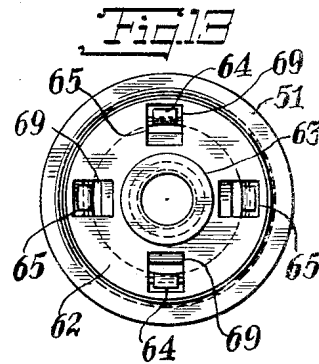
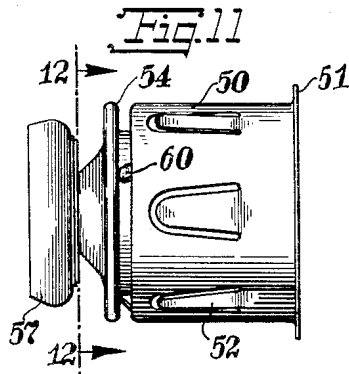
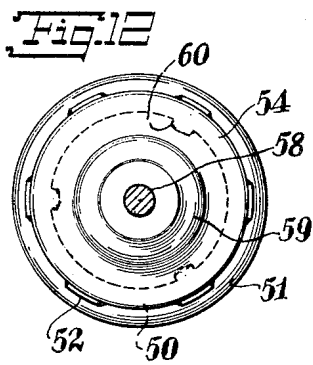
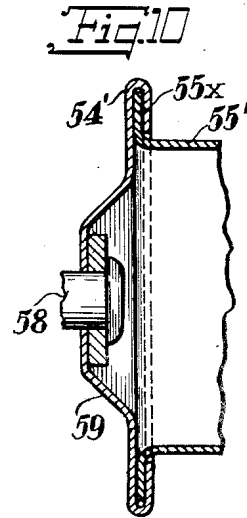
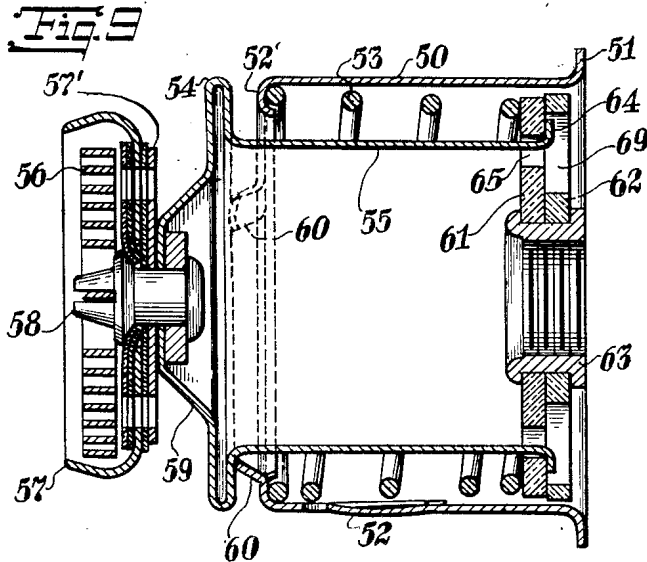
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ELECTRIC CIGAR LIGHTER

2,531,901

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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,531,901

## ELECTRIC CIGAR LIGHTER

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Application July 25, 1946, Serial No. 686,188

11 Claims. (Cl. 219—32)

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My invention relates to what are commonly termed cordless electric lighters for cigars, cigarettes and pipes and of the type suitable for installation in motor vehicles. They may be used however anywhere.

The main object is to provide a small, reliable lighter plug which can be made economically according to ordinary shop practice and interchangeably used in sockets which will also be of factory production. In other words, the plugs and sockets need not be matched but any plug will fit any socket of a lot for which it is designed.

One object is to make as much of the device as possible of metal and yet provide a quick starting lighter which will have long life and will not become overheated.

Another object is to avoid the use of parts made of molded insulation such as thermosetting resins which, if overheated by careless handling of the lighter, may be distorted, swell or blister causing the plug to bind in the socket and rendering the lighter useless. Such distortion occasionally locks the plug in closed circuit position with very undesirable results.

A further object is to provide a cigar lighter plug having substantially all of the parts made of stampings which when produced in bulk by ordinary commercial processes are more precise as to dimensions and less costly than similarly functioning parts produced by molding phenolic resins or by automatic lathes.

A further object is to provide a lighter plug of pleasing appearance, excellent functional properties and low cost when produced in large quantities which frequently involve several hundred thousand lighters per year in commercial practice. The majority of automobiles now produced are fitted with cigar lighters as standard equipment. This offers the manufacturers of cigar lighters a very large, but cost and quality conscious market. The difference of as little as one cent per unit between competing makes may result in the gain or loss of orders totaling many thousands of dollars. In the past the use of lighter components produced by molding phenolic resins and of components produced on automatic machines known as "screw machines" has been commonly accepted practice. The total production of such parts has run into many millions in the last decade. The cost of parts of the current type of lighter plugs is quite high as compared with parts of broadly similar functions made from sheet metal and sheet insulation.

I have, therefore, devised constructions which

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employ components suitable for high production at low cost by simple stamping or drawing press operations and which constructions by the suitable disposition of air gaps, small contacting conductive areas, reflective surfaces and simple insulating washers to arrest or retard heat flow to the knob are useful and acceptable for commercial production.

I have further improved over commercial constructions of the prior art by eliminating screw threads except for mounting the knob. The knob is usually supplied in shape and material to match the other control knobs of the automobile on which the lighter is to be used and which vary widely between different makes of cars and different models of the same maker.

The preferred form constitutes improvements over that of Patents 1,980,157 and 2,338,565.

Fig. 1 is an aligned sectional view of a socket and one form of plug of my invention on an enlarged scale.

Fig. 2 is a side view of the plug of Fig. 1 with a knob.

Fig. 3 is a rear end view of the plug without the knob.

Fig. 4 is an exploded view of the parts of the plug of Fig. 1.

Figs. 5 and 6 are cross-sectional views on the planes of the lines 5—5 and 6—6, respectively, of Fig. 4.

Fig. 7 is a front end view of the plunger part of the plug of Fig. 1.

Figs. 8 and 8<sup>a</sup> are detail face views of insulating washers of Fig. 1.

Fig. 9 is a longitudinal sectional view of another form of plug of my invention adapted to be used in a socket such as shown in Fig. 1.

Fig. 10 is a sectional view of a fragment of a modified form of the plunger body part of Fig. 9.

Fig. 11 is a side view of the plug of Fig. 9.

Fig. 12 is a transverse section and front end view, the section being taken on the plane of the line 12—12 of Fig. 11.

Fig. 13 is a rear view of the plug of Fig. 11.

Fig. 14 is a front end view of the plunger part of the plug of Fig. 9.

Fig. 15 is a front end view of the outer shell of the plug of Fig. 9.

Figs. 16 and 17 are detail views of two insulating washers for the plug of Fig. 9.

Fig. 18 is an end view of the bushing of Fig. 9 for receiving a knob such for instance as is shown in Fig. 2.

Fig. 19 is a side view and section of guiding

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washers such as shown in Figs. 9, 13, 16 and 17 with a stud for receiving a knob.

In Fig. 1 I have shown a sectional view of one form of plug made according to the invention and mounted in a type of socket assembly with which the plug may be used. Such a socket assembly is generally used on automobiles and is attached to the instrument panel. The socket 10 passes through a hole in the instrument panel (not shown) and is pressed against it by nut 10' and shell 12. Nut 10' is threaded on sleeve 11 to which is attached washer 12'. The above parts are incorporated into the ground side of the electric system of the automobile of which socket 10 becomes one terminal.

Central terminal stud 13 carries bimetal latch contacts 14 and secondary spider contacts 15 which are insulated and supported by sleeve 13' and washer 16. These contacts 14 and 15 form the live terminals of the socket as stud 13 is connected to the ungrounded side of the electric system of the automobile. The side wall of the socket usually has one or more spring fingers 18 biased inwardly to engage some part of the plug and serve as spring loaded ground contacts. It should be understood that, while bimetal latch contacts are shown, they are not essential as the secondary contacts 15 will suffice to engage cup 28 and close the circuit.

The plug has two main assemblies, i. e. the shell and the plunger element. The shell is the part which is normally supported and stationary in the socket and the plunger element has the igniter unit and the knob or handle which is mounted to move the plunger element within the shell.

The plug itself which is the subject of my present invention has a tubular metallic shell 20 and a metallic front end disc 21. In the form shown in Fig. 1, this disc 21 has a ring 22 surrounded by and appreciably smaller than flange 23 of shell 20. Insulating washers 24 and 25 serve to prevent contact between any part of shell 20, disc 21 and ring 22. Washer 25 is so proportioned as to centralize ring 22 in the opening of flange 23. When the rear end of ring 22 is staked over at several points such as 26, the parts are secured in accurate relationship with only small areas in contact with each other and with a continuous air gap between ring 22 and flange 23. The seemingly minor matter of maintaining only small contiguous areas is important as the transmission of heat from the igniter unit to the rear rim of the shell 20, which may be contacted by the fingers of a user of the lighter, is thereby minimized.

The igniter unit, generally of conventional form, may have any suitable resistance coil 27 having one end secured to the cup 28, which serves as the plug's live terminal, and the other end to the grounded central stud 29 which is electrically and mechanically connected to the plunger tube 30. The cup 28 is insulated from the stud 29 and from washer 29' by mica or equivalent washers such as 28'. The unit is noteworthy in that it has only two small perforations 28<sup>x</sup>, used to align the part during assembly, instead of the conventional six or thereabout, relatively large perforations. The rear washer 29' is made of bright stainless steel or other similar material. I have found that this construction with minimum perforations and a backing having bright reflective surfaces materially aids in retarding the flow of heat to the rear of the plug.

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The igniter stud 29 is secured to the plunger sleeve or tube 30 for instance by being frictionally driven into and held by a metal washer 31 in the bottom of the tube. This tube has outwardly extending ribs 33 which are an accurate sliding fit in the tubular guide 32 which is integral with disc 21. These ribs, however, only engage guide 32 when the plunger is in the forward or circuit closed position when contact between ribs and the guide forms part of the grounded side of the circuit. The basic diameter of the tube 33 is appreciably smaller than the inside diameter of the guide 32 and the difference between these diameters affords an annular air gap 30' which offers resistance to the flow of heat from the igniter unit through tube 30 to disc 21 after the circuit has been broken and the heated igniter is available for use. The rear end of the tube 30 is flared outwardly and secured to two insulating discs or washers 34 and 35 which are guided in the shell 20. The flared end of tube 30 has three arcuate flanges 36 which fit and are crimped over the edges 34' of the notches of washer 34. The major diameter of 34 is proportioned to slide freely on and be guided by the interior surfaces of ribs 33 of shell 20. Washer 35 has three outwardly extending arms with grooves or notches 37 which straddle and are guided by the radial faces of ribs 33 within the shell 20. The effective diameter of washer 35 at the bottom of the notches 37 is slightly less than the major diameter of washer 34 and contact between 35 and 20 is only on the radial faces of the notches 37. The angular extension between the arms of 35 is greater than the angular extension of arcuate flanges 36 and the effective diameter of 35 at the edges 35' is smaller than that of the crimped over edges of arcuate flanges 36 so that there is no direct contact between washer 35 and tube 30. This arrangement aids effectively in minimizing the transmission of heat from tube 30 to shell 20 and to the knob mounting means which comprises a bushing 40 (Fig. 1) or a stud 63' (Fig. 19) connecting washers 34 and 35 together at the center. Washer 35 is substantially thicker than the metal of flanges 36 which are crimped over washer 34 so that there is no possibility of direct contact between the base of a knob such as 42 and tube 30. If desired another washer 42', which is intended primarily as an ornamental or trim medium, may be used to engage the base of the knob and provide an air gap 42<sup>x</sup> as a further heat barrier. Due to the interlock between washer 35 and ribs 33 there can be no relative rotation. This facilitates tightening a knob on its threaded support while holding the outer shell by any suitable means.

A spring 43 is interposed between the disc 21 and the outer end of the tubular plunger 30 with an insulating washer 44 preferably between the spring and the tube. The shell 20 has an inwardly curled flange 45 which serves to limit the incursion of the plug into the socket and also serves as an outer stop for the outer edges of washer 35. Spring fingers 46 serve to frictionally hold the plug in the socket.

In the form shown in Fig. 1, it is understood that the edge of the disc 21 engages the finger 18 and the circuit is closed by pressing the plug plunger into the socket until the igniter cup 28 engages the latch contacts 14 as shown by the broken line view of a portion of cup 28 or the stationary contacts 15.

When heated to the predetermined degree, the latches 14 will release the igniter cup, break the

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circuit and the spring 43 will retract the plunger ready to permit the plug to be withdrawn and used.

From the foregoing description it will be seen that by the careful employment of air gaps, restriction of the areas of contacting surfaces and the use of simple flat insulating washers, the transmission of heat from the heating element to the knob is effectively blocked although metallic materials form the major constructional media.

The device may be easily inserted and actuated. It will not overheat even though repeatedly used. The plug will not jump out of the socket when released by the latches and it may be held in for reheating if desired.

In the simplified form shown in Figs. 9 to 16 on sheet two of the drawings, the shell 50 has an outwardly turned flange 51 at its rear to limit its incursion into the usual socket and has spring fingers 52 to hold it frictionally within the socket. The front end of the shell has an intumed flange 52' serving as an abutment to receive and hold one end of the spring 53.

In this case the outwardly projecting contact flange 54 is formed as an integral part of the tube or cylinder 55 which carries the igniter coil 56 and contact cup 57 and forms a part of the plunger. Stud 58 is riveted to the end of the hollow carrier part which is pressed outwardly in conical form at 59 so as to space the igniter away from the contact flange 54.

In other respects the igniter unit assembly is similar to that described in relation to Fig. 1. The substantially conical surface of 58 forms a reflective surface which disperses heat radiated from the polished back of washer 57' and further assists in retarding flow of heat toward the knob.

Shell 50 has lugs 60 extending from flange 52' which serve as guides and to space the main part of the shell away from the plunger and thus leave room for air circulation to prevent overheating. The ends of the lugs or fingers 60 are formed with a slight curve as shown in Figs. 11 and 15. This greatly restricts the heat conductive area of contact between 50 and 55.

These three lugs are so placed around the periphery of the shell 50 that there is metallic contact between the shell 50 and the tube or cylinder 55 throughout less than fifty percent of its periphery.

The plunger body may be formed of two pieces as shown in Fig. 10 where part 55' has a flange 55\* which is clamped within the rim 54' of the end of the plunger.

Two insulating washers or discs 61 and 62 are fastened together at their centers by the knob carrying bushing 63 (Fig. 9) or knob carrying stud 63' (Fig. 19) and these parts are mounted on the rear of tube 55 and secured thereto by a plurality of lugs 64 which are formed integral with the tube. These lugs pass through openings 65 in washer 61 and are then bent over so as to secure washer 61 to the tube 55 and prevent relative rotation between 61, 62 and 63. Openings 69 in washer 62 are angularly aligned with and are larger than openings 65 to allow the entry of a tool to bend the lugs to the position shown in Fig. 9. The openings 69 are large enough to avoid any contact between lugs 64 and washer 62. Washer 61 is appreciably smaller in diameter than washer 62 which is a free sliding fit in shell 50 and guides the rear end of the plunger assembly therein. By arranging and proportioning the parts in this way the passage of heat from the plunger to the shell 50 is restricted, as is its

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passage to the knob carrying means. Washer 61 forms the rear abutment for spring 53.

In Fig. 19, I have shown a pair of the washers 61 and 62 (which correspond with washers 34 and 35) provided with an externally screw threaded stud 63' which may be used in place of the internally threaded bushings of Figs. 1 and 9 if required by the design of the knob.

It will be understood that according to the present invention either the igniter cup 28 or 57 or a flange such as 21, 54 or 54' may coact with bimetal latches to hold the circuit closed as shown in Patent No. 2,244,234.

According to Fig. 1, the contact flange 21 is carried by the stationary part of the outer shell while in Fig. 9 the flange 54 is movable with the inner plunger.

The igniter cup and the contact rim will serve to close the circuit by contact either simultaneously or sequentially depending upon their positions relative to the contacts in the stationary socket with which the plug is used and similarly the circuit will be broken simultaneously at both contacts or at either one depending upon the design of the socket and plug.

The invention requires a minimum cost and affords a maximum of simplicity, strength, long life, and reliability.

The method of supporting and guiding the plunger and igniter is adapted to both forms of the invention as shown and described and permits the use of knobs which require either bushings or studs for their connection by the simple substitution of the supporting and guiding washers with the necessary bushing or stud.

The construction shown in Figs. 1 to 8, inclusive, is claimed in my application Serial Number 137,747 filed Jan. 10, 1950.

I claim:

1. A cigar lighter plug comprising an outer metallic shell member for fitting in a socket and having an interiorly extending flange at its front end with three-spaced projecting guide lugs, a tubular metallic plunger member guided to slide within the lugs of said shell member and having a wall abutting against said lugs, an igniter element secured to the front end of said tubular member, an insulating washer secured to the rear end of said tubular member and slidable in contact with the outer shell member, a spring compressed between said flange and said washer and means for preventing said washer from rotating with respect to said plunger member.

2. A plug member for a cigar lighter comprising an outer metallic shell adapted to be inserted into a socket and having an internal flange at its front end and an outturned flange at its rear end, a metallic plunger sleeve slidable within said shell and having a flanged front end constituting a contact, an igniter member secured to said flanged end, an insulating washer secured to the rear end of said plunger sleeve and slidable in contact with said shell, a knob support mounted in said washer and a spring compressed between said intumed flange of the outer shell and said washer, said outer shell having a plurality of inwardly projecting lugs acting as guides for the plunger in the shell and as stops to limit the rearward movement of said sleeve in said shell.

3. A cigar lighter plug adapted to be inserted into a socket having contacts, said plug comprising an outer metallic shell slidable in such socket and having flanges at its opposite ends, the flange at its rear end serving to limit the insertion of the plug into the socket, a metallic

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plunger sleeve having a main tubular part slidable within the shell and having an outwardly projecting contact flange near its front end, an igniter element secured to the extreme front end of the plunger sleeve and spaced apart from said contact flange, an insulating washer having perforations, a second insulating washer mounted adjacent the first-named washer and having perforations, said sleeve having lugs projecting into some of said perforations and bent over the outer face of said first-named washer, a central knob supporting member connecting said washers together, one of said washers serving to slidably guide said plunger sleeve in said shell, a spring surrounding the tubular part of said sleeve between the first-named washer and the flange at the front end of said outer shell, said plunger sleeve, igniter element and said washers being rotatable together within said outer shell.

4. A cigar lighter plug adapted to be inserted into a socket having contacts, said plug comprising an outer metallic shell slidable in such socket and having flanges at its opposite ends, the flange at its rear end serving to limit the insertion of the plug into the socket, a metallic plunger sleeve having a main tubular part slidable within the flange at the front end of said shell and having a contact flange near its front end, an igniter element having a contact cup secured to the extreme front end of the plunger sleeve and spaced apart from said contact flange, an insulating washer having perforations, said sleeve having lugs projecting into said perforations and bent over the outer face of said washer, a central handle supporting member secured in said washer, said washer serving to slidably guide said plunger sleeve in said shell, a spring surrounding said sleeve between said washer and the flange at the front end of said outer shell, said plunger sleeve, igniter element and said washer being rotatable together.

5. A plug for a cigar lighter comprising an outer metallic shell for sliding engagement with the inner wall of a socket and having an enlarged diameter at its rear end and being interiorly formed at its front end to provide an abutment for a spring and to provide stop lugs, a longitudinally movable metallic plunger member partly within said shell and partly without at the front end of said shell, an igniter unit mounted on the front end of said member and having a contact, a second contact on said plunger member comprising a flange intermediate said first contact and the rear end of said shell and adapted for substantially coaxial guiding sliding contact within the inner wall of a socket, said plunger member having a portion of less diameter than said flange and extending rearwardly therefrom within said shell, insulating knob carrying means attached to the rear end of said portion and having peripheral sliding guiding engagement with the inner wall of said shell, a spring within said shell between said abutment and said insulating knob carrying means and stressed to move said plunger member rearwardly relative to said metallic shell, said lugs coacting with said plunger member to limit rearward movement thereof, said lugs and said abutment being so radially spaced from said reduced portion that when said plunger member is pressed forward of its rearmost position it is guided and supported only by said flange and said peripheral portion engaging the inner walls of said socket and said shell respectively.

6. An electric lighter plug comprising an outer

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tubular metallic member slidably engageable in a socket and having an inturned flange with spaced projecting lugs, an inner tubular metallic member slidable in the outer member and having an outwardly extending flange abutting against said lugs, an igniter member carried by said inner member, a handle supporting bushing, an insulating washer carried by said bushing and connected to the inner tubular member and slidable within and in contact with the outer member and a spring surrounding the inner member and compressed between said inturned flange and said washer.

7. A plug for a cigar lighter comprising an outer tubular metallic shell having an outwardly flaring flange at its rear end for engaging the rim of a supporting socket and an inturned flange at its front end, a plunger reciprocable in said shell having an igniter unit at its front end and a bushing for an operating knob at its rear end, said plunger including a tubular metallic member having the igniter unit secured to its front end, an insulating washer secured to the bushing and having a portion secured to the rear end of said tubular member and slidable in contact with said shell, means carried by the front end of the outer shell for guiding the plunger with metallic contact throughout less than half of the periphery of the plunger and leaving air spaces between the tubular metallic member of said plunger and the shell and a spring compressed between said means and said washer.

8. A cigar lighter plug comprising an outer member having a cylindrical metallic shell with a flange forming a spring abutment at its front end and open at its rear end, an inner plunger member slidable within the shell and including a tubular metallic body guided in a part of said outer member at its front end, an igniter unit secured to the front end of said tubular body, the inner of said members having an outwardly flaring contact flange located between said igniter unit and the abutment for said spring, two insulating washers at the rear of said body, one of said washers being interlocked with the body, a spring compressed between the abutment in the outer member and one of said washers, the other washer being slidable and guided in the rear end of the outer metallic shell and projecting beyond the end of said metallic body to thermally insulate it from an attached knob and a knob-supporting bushing securing said washers together, said outer shell having means against which the plunger strikes to limit the rearward movement of the plunger in the shell, the shell of the outer member and the body of the plunger being spaced apart throughout nearly all of their adjacent surfaces to allow for the circulation of air between said outer shell and the inner tubular metallic body and thermally insulate the outer member from the inner member.

9. A plug for a cigar lighter comprising an outer tubular metallic shell having an outwardly flaring flange at its rear end for engaging the rim of a supporting socket and spring supporting means at its front end, a plunger reciprocable in said shell having an igniter unit at its front end and a bushing for an operating knob at its rear end, said plunger including a metallic tubular member having the igniter unit secured to its front end, an insulating washer secured to the bushing and having a portion secured to the rear end of said tubular member and slidable in said shell, the front end of the outer shell having

integral circumferentially spaced lugs for guiding the front of the plunger at places spaced apart from each other around the plunger leaving air spaces between such places of contact and a spring compressed between said means and said washer.

10. A plug for a cigar lighter comprising an outer tubular metallic shell having an outwardly flaring flange at its rear end for engaging the rim of a supporting socket and spring supporting means at its front end, a plunger reciprocable in said shell having an igniter unit at its front end, a bushing for an operating knob at its rear end and a contact flange between the igniter unit and the spring supporting means of the outer shell, said plunger including a tubular metallic member having the igniter unit secured to its front end, an insulating washer secured to the bushing and having a portion secured to the rear end of said tubular member and slidably supported in said shell, means carried by the front end of the outer shell including circumferentially spaced lugs for guiding the front of the plunger at contact places spaced apart from each other around the plunger leaving air spaces between such places of contact and a spring compressed between said spring supporting means and said washer, said lugs abutting against said contact flange in the inactive position of the plunger in the outer shell.

11. In an electric igniter plug, an outer cylindrical metallic shell member for insertion into a supporting socket, said outer shell having an outwardly projecting flange abutting against a part of a supporting socket when the plug is in-

serted in the socket and an inturned flange at its front end, a plunger member having a cylindrical inner metallic body slidable in said shell member, a contact flange at the front end of the body and an igniter projecting forwardly from said contact flange, an insulating washer secured to the rear end of said plunger body and guided to slide in the outer metallic sleeve and a spring interposed between said insulating washer and the front end flange of said outer shell member, said outer shell member having a number of circumferentially spaced inwardly and forwardly projecting lugs slidably guiding the front end of said inner body in said outer shell, the tips of said lugs constituting the only metallic contact between said outer shell and said inner body.

PHILIP E. ASHTON.

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