

[54] CIGAR LIGHTER IGNITING UNIT

[75] Inventors: Laurence G. Horwitt, New Haven; Donald J. Mattis, Norwalk, both of Conn.

[73] Assignee: Casco Products Division, Sun Chemical Corporation, Bridgeport, Conn.

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[52] U.S. Cl. .... 219/267, 219/265, 219/270

[51] Int. Cl. .... F23q 7/22

[58] Field of Search ..... 219/264, 265, 267, 270

[56] References Cited

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|           |         |                     |         |
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 Attorney, Agent, or Firm—Cynthia Berlow

adapted for use with the socket or receptacle portion of an electric cigar lighter of the type mounted in automobile instrument panels. Our unit has the usual knob at the outer end and a convolutely wound electric heating coil at the inner end with a spacer tube therebetween. The heating coil is surrounded and enclosed on the side adjacent the spacer tube by a conductive cup. The cup has inwardly projecting lanced shoulder portions, circumferentially spaced to support the coil in a manner to provide coil ventilation. The spacer tube is mounted within a cylindrical friction sleeve which also serves as a guide member. The spacer tube is held in retracted relation within the sleeve by an internally mounted coil spring. The sleeve is telescoped within a cylindrical ashguard which moves axially to enclose the heating element when the igniting unit is removed from the receptacle. The spacer tube has an annular partition adjacent the heating coil cup which is provided with closely spaced peripheral indentations in which corresponding projections on the cup are adapted to be engaged, with a deformable layer of insulating material therebetween, such engagement occurring without manual assistance during assembly.

6 Claims, 5 Drawing Figures

[57] ABSTRACT  
 Our invention comprises a "pop-out" igniting unit

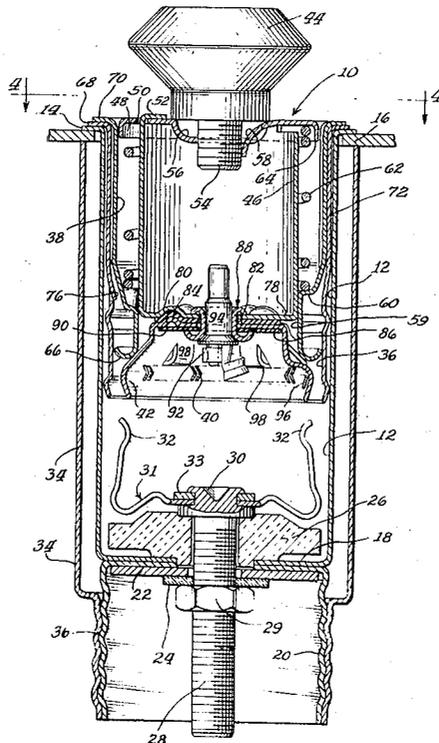


Fig. 1.

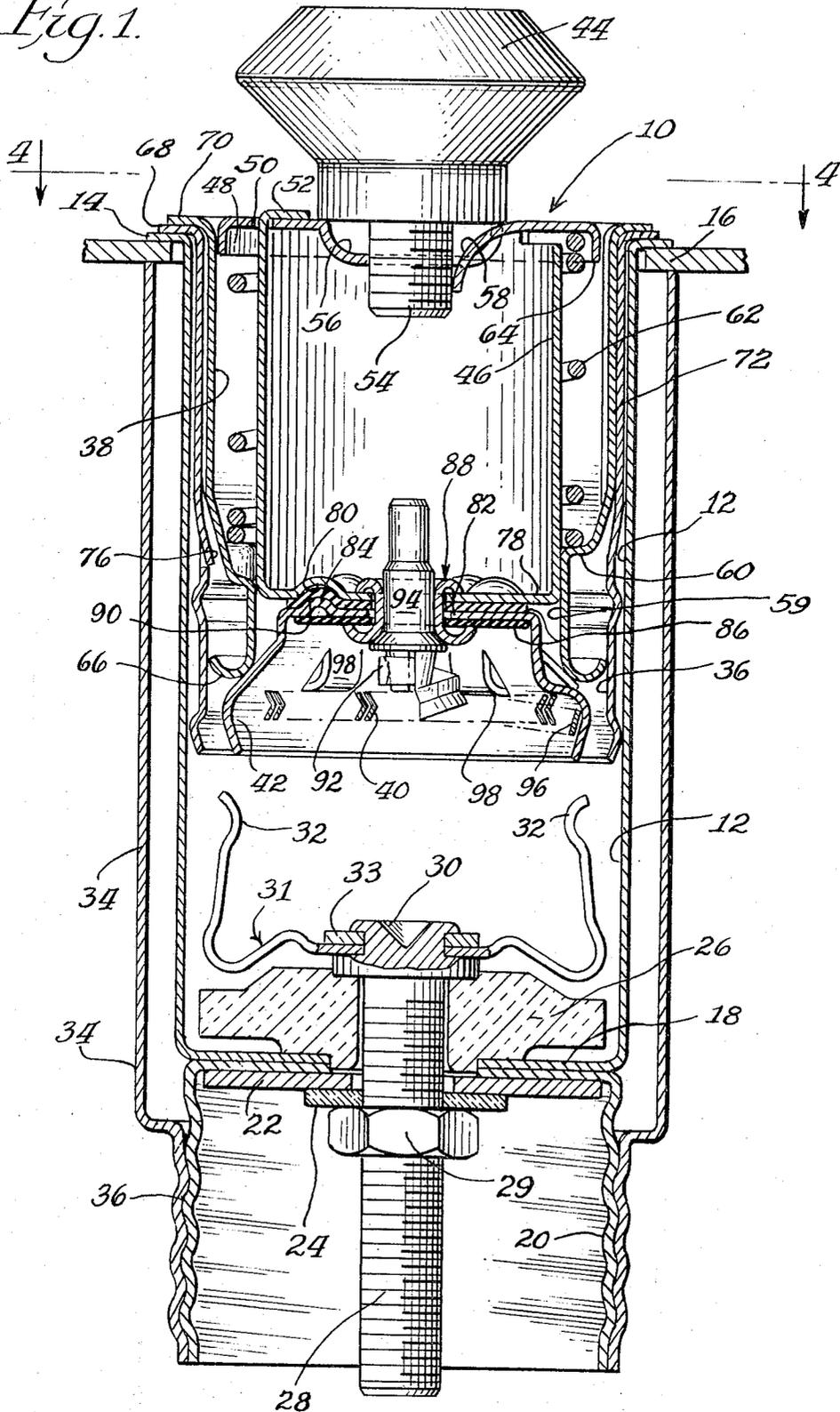


Fig. 2.

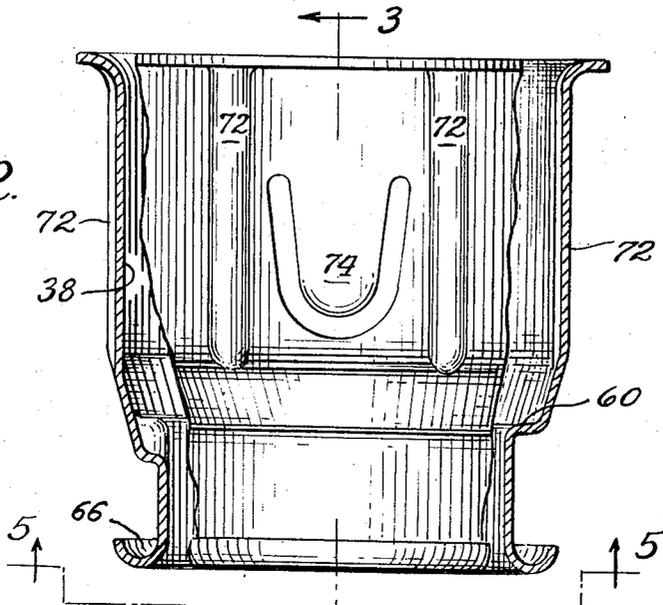


Fig. 4

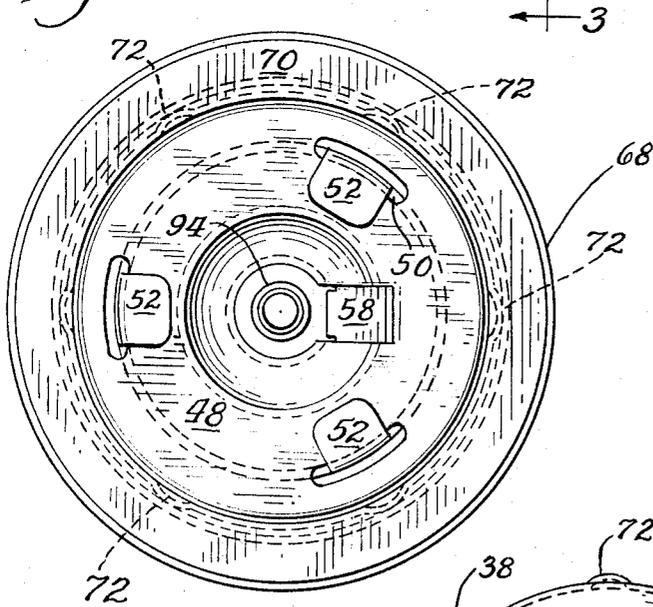


Fig. 3.

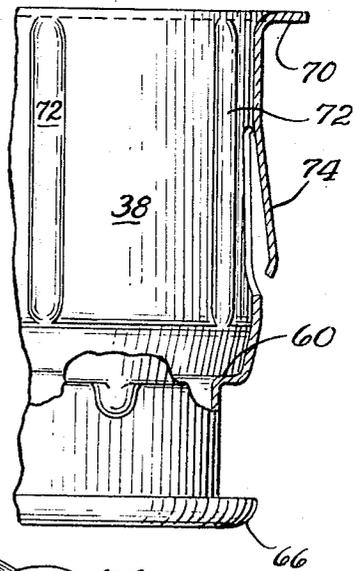
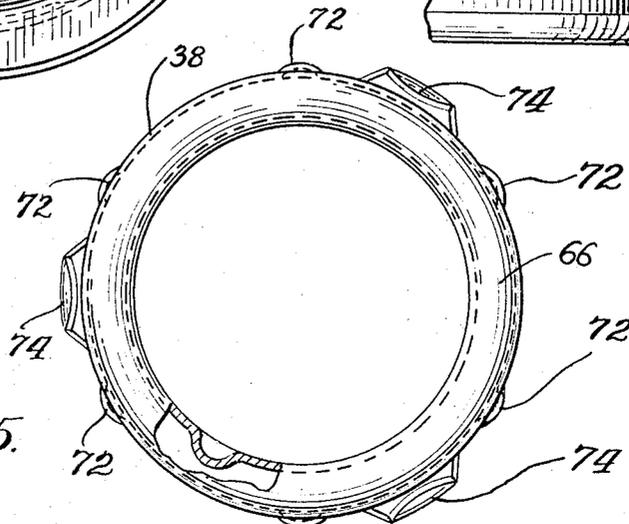


Fig. 5.



## CIGAR LIGHTER IGNITING UNIT

## BACKGROUND

Electric cigar lighters of the type to which this invention relates are generally mounted in motor vehicle instrument panels and are sometimes combined with the ash receivers in such vehicles. Generally, they consist of a removable or pop-out igniting unit removably inserted in a cooperating cylindrical receptacle mounted in the dash board or in an ash receiver assembly. Such lighters are the subject of numerous patents, examples of which include U.S. Pat. No. 2,727,976 issued Dec. 20, 1955 to J. H. Cone; U.S. Pat. Nos. 2,959,663, and 2,959,664 issued Nov. 8, 1960 to L. E. Fenn; and U.S. Pat. No. 3,433,928 issued Mar. 18, 1969 to applicant L. G. Horwitt. In such lighters, the igniting unit has a knob at the outer end and a heating coil enclosed in a contact cup at the inner end. When the igniting unit is inserted into the receptacle and the knob is then pressed inwardly as far as it will go, the contact cup is engaged by bimetallic fingers at the base of the receptacle. The contact fingers serve as an electrical switch and, when engaged with the cup, cause the heating coil to be energized. As the coil becomes heated to a red glow, the ambient heat resulting therefrom causes the bimetallic fingers to retract outwardly, in the manner of a thermostat, thus breaking the electrical circuit and releasing the igniting unit. By reason of internal spring biasing within the igniting unit, the knob and coil assembly "pops" back quickly when released by the bimetallic fingers and the knob protrudes further than usual by reason of its axial retraction within a tubular ashguard enclosure.

Electric cigar lighters of this type are purchased in large quantities by automobile manufacturers and others who require that the unit cost be low, that such units have a long service life and that they perform dependably throughout.

A significant part of the cost of such lighters is the labor involved in manual assembly. Such assembly has been necessitated for proper combining of the dozen or more small parts which comprise the usual igniting unit.

It is a principal object of our invention to design an igniting unit which can be manufactured and sold at reduced unit cost by reason of certain assembly operations being automated. It is another object of our invention to provide such an igniting unit in which the heating coil is better ventilated and therefore less subject than other such units to failure due to overheating. It is a further object of our invention to develop an igniting unit which has longer life expectancy and greater functional dependability than units now generally available in the industry.

## SUMMARY

Our improved cigar lighter igniting unit consists essentially of a circumferentially enclosed heating coil connected to a knob by means of a spacer tube and spring mounted within a pair of cooperating, telescoped inner and outer sleeves.

The spacer tube has a cap of greater diameter at the end adjacent the knob, the peripheral portions of the cap serving as a first spring seat. The inner sleeve, in which the spacer tube is mounted, has a neck portion spaced from the cap, providing an inturned annular ledge which serves as a second spring seat. A coil spring

is engaged between the first and second spring seats to urge the knob and heating coil assembly into normally retracted relation with respect to the inner sleeve in which it is mounted. The outer sleeve, in which the inner sleeve is frictionally engaged, permits limited axial movement of the inner sleeve so that when retracted therewithin, an end portion of the outer sleeve serves as an ashguard surrounding the heating coil.

The heating coil enclosure is somewhat cup-shaped and is adapted, when pushed inwardly, to be engaged by spaced bimetallic fingers, located in the base of the cooperating cigar lighter receptacle. The engagement between the fingers and enclosure completes an electrical circuit through the heating coil. When the coil is sufficiently heated, the fingers are caused by ambient heat to retract or spread apart and release the heating coil enclosure, thus permitting the igniting unit to pop back due to the coil spring biasing into retracted position.

The heating coil, which is preferably a convolutely wound continuous strip of electrical resistance alloy, is secured at its center to the interior of the cup-like enclosure by means of an axial rivet. The outer convolutions of the coil are supported against axial rearward displacement by a plurality of circumferentially spaced, shoulder-like indentations in the wall of the enclosure.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a longitudinal sectional view showing a preferred embodiment of our cigar lighter igniting unit with the heating coil disposed in its normal retracted position and mounted in a receptacle for such units;

FIG. 2 is a view, partly in section, of the friction sleeve and guide portion of the igniting unit of FIG. 1; FIG. 3 is a fragmentary view on the line 3—3 of FIG. 2;

FIG. 4 is a view on the line 4—4 of FIG. 1; and FIG. 5 is a view on the line 5—5 of FIG. 2.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment of our improved igniting unit is shown in the accompanying drawing wherein the igniting unit is referred to generally by the reference numeral 10. In normal use, the igniting unit 10, which is tubular in shape, is retained telescopically in readily removable frictional engagement within a similarly-shaped receptacle of holder 12. At its outer end, the holder 12 is provided with a radially outwardly extending annular flange 14 which bears against the portions of an instrument panel 16 surrounding an opening therein in which the holder 12 is mounted.

At its inner end, the holder 12 has an annular end wall 18 which is engaged with an assembly comprising a threaded screw shell 20 with a cooperating steel washer 22 and an insulating washer 24 on one side of said annular wall 18, and an insulating block 26 on the other side thereof. Said annular wall 18, screw shell 20, steel washer 22, insulating washer 24 and insulating block 26 are provided with axially aligned apertures through which a threaded stud 28 is passed, with a nut 29 engaged thereon at one end. At the other end, the stud 28 is provided with a hollowed-out extension 30 of reduced diameter which protrudes through aligned apertures in a more or less U-shaped bimetallic strip 31 with up-turned contact fingers 32 and a transverse strap 33. The portion of extension 30 which protrudes

beyond the strap 33 is riveted thereagainst as shown in FIG. 1.

A cylindrical clamping shell 34 surrounds the tubular holder 12 and bears at its outer end against the under side of the instrument panel 16. At its inner end, the clamping shell 34 is provided with a threaded neck 36 of reduced diameter which is threadably engaged with the screw shell 20 and tightened sufficiently to exert clamping engagement on the instrument panel 16 between the end of the clamping shell 34 and the annular flange 14.

The principal components of the igniting unit 10 are a tubular ashguard 36, a friction sleeve 38 telescopically engaged within said ashguard 36 and a heating element 40 mounted within and circumferentially surrounded by a contact cup 42 at the inner end of the igniting unit 10. At its outer end, the igniting unit 10 is provided with a knob 44 which, is connected to the contact cup 42 by means of a tubular plug body or spacer member 46. At its outer end, the spacer member 46 is provided with a circular cap 48, of greater diameter than the spacer member 46, said cap 48 having annularly spaced slots 50, as shown in FIG. 4. Integral lugs 52 projecting from the spacer member 46 are spaced to cooperate with the slots 50 and project there-through. During assembly, the lugs 52 are bent inwardly so as to be clinched over the top of the cap 48 to secure same to the spacer tube 46.

The knob 44 has a threaded axial extension 54 which extends through an opening in the recessed knob seat 56 in the cap 48. The cap 48, which is preferably of spring steel, has a portion cut in the form of a radially inwardly extending pressure tooth 58 to engage the threads of said knob extension 54. As the knob 44 is tightened in the opening of the knob seat 56, the pressure tooth 58 is caused by tracking of the threads of the extension 54 to be squeezed thereagainst in substantially locking relation.

Near its inner end, the friction sleeve 38 has a neck portion 59 of reduced diameter providing a radially inward annular ledge or spring seat 60. A coil spring 62, which encircles the spacer member 46, is interposed between said seat 60 and the annular portion of the cap 48 extending beyond the spacer member 46. Said annular portion of the cap 48 is provided with a peripheral down-turned skirt 64 to prevent displacement of the end of the spring 62 which bears against said annular portion of the cap 48.

At its inner end, the neck portion 59 of the friction sleeve 38 terminates in an outward annular roll 66, the diameter of which is substantially the same as that of the upper portion of the friction sleeve 38. The outer periphery of said roll 66 serves as a guide for the inner end of the friction sleeve 38. It bears in slidable relation against the tubular inner wall of the ashguard 36 and resists axial misalignment therewithin. Also, the annular roll 66 serves as a circumferential shoulder against which the contact cup 42 is normally retracted by reason of the resilient outward pressure of spring 62, exerted through the cap 48 on the spacer member 46.

The tubular ashguard 36 is provided at its outer end with a radially outwardly extending annular flange 68 so that when the igniting unit 10 is inserted into the tubular holder 12, the annular flange 68 is engaged annularly with the flange 14. Likewise, the friction sleeve 38 has a corresponding annular flange 70 which cooperates with flange 68 to limit inward movement of said

friction sleeve 38 with respect to the ashguard 36. Thus, when the unit 10 is in normal storage position, the annular flanges 14, 68 and 70 are in engagement, as shown in FIG. 1.

The cylindrical body of the friction sleeve 38 is provided with a plurality of elongated, circumferentially spaced, longitudinal ribs 72, raised sufficiently beyond the surface of the sleeve 38 for non-binding slidable engagement within the tubular interior of the ashguard 36. The ribs 72 serve as guides to prevent axial misalignment of the friction sleeve 38 within the ashguard 36. The friction sleeve 38 may rotate, however, in the ashguard 36 and is operational in any rotational relationship with the ashguard, thus permitting easy, low-cost automatic assembly. It is, of course, mechanically possible to automate the assembly of previously known igniters, but those of which we are aware have required such precision in alignment of parts that manual assembly has been more economic than automated assembly. By developing a design in which such precise pre-alignment of telescopic parts is obviated, we have made it economically more feasible to automate the manufacture of such units.

In order to exert frictional resistance against axial reciprocation of the friction sleeve 38 within the ashguard 36, the cylindrical body of the friction sleeve is lanced, preferably at three circumferentially spaced locations, to define yieldable friction members 74 which are bent slightly outwardly to cause the free ends of said members 74 to bear with carefully calibrated resilient pressure against the tubular inner walls of the ashguard 36. The pressure should be sufficient to retain the friction sleeve 38 in any selected axial position to which it is moved within the ashguard 36. The precise alignment of the friction sleeve 38 within the ashguard 36 assures constant uniform spacing between the sleeve 38 and the inner surface of the ashguard 36, thus preventing any variation in total side force pressure by the inner surface of the ashguard 36 on the yieldable friction member 74. It is of particular importance to avoid any pressure variation of the type that would affect the base area of the friction member 74 and cause it to lose any of its resilient pressure against the ashguard 36.

The ashguard 36 is provided about midway of its length with circumferentially spaced indents 76 interposed in the retraction path of the outer periphery of the roll 66, so as to prevent retraction of the friction sleeve 38 beyond the point determined by the location of the indents 76. Thus the telescopic reciprocation of the sleeve 38 within the ashguard 36 is limited inwardly by the flange 70 and outwardly by the indents 76.

The inner end of the spacer member 46 has an inward annular or transverse wall 78 having a plurality of closely spaced, circumferentially arranged, nib-receiving concavities 80. The top or transverse back wall 82 of the contact cup 42 has a plurality of upwardly projecting nibs 84 shown as being bulbous or rounded and in equally spaced annular relation, so disposed as to cooperate with and be received by corresponding concavities 80. Preferably, there is a lesser number of nibs 84. The number of nibs should be numerically divisible into the number of concavities 80. In a preferred form, we provide the annular wall 78 with nine concavities 80 and the top wall 82 of the contact cup 42 with three upstanding nibs 84. The concavities 80 are sufficiently closely spaced and are contoured as shown so that protuberances on an adjacent

surface, when pressed with moderate pressure into face-to-face engagement with the annular wall 78, will cause such protuberances to be guided rotationally into the nearest cooperating concavities 80.

Insulating washers or wafers 86 of deformable mica or similar insulating material are placed on each side of the top wall 82 of the contact cup 42, the center hole portions thereof being aligned axially with a central aperture in the annular wall 78 of the spacer member 46 and a corresponding aperture in the top wall 82 of the contact cup 42. As is well known, mica sheets have smooth-surfaced side walls. A grommet or eyelet 88 projects through said axially aligned holes and apertures and is flared outwardly as shown to grip the annular wall 78 on one side and the top wall 82 of the contact cup 42 in a manner to hold the assembled spacer member 46, contact cup 42 and mica washers 86 in clamped together engagement. Portions of the mica washer 86 between the walls 78 and 82 are deformed or distended as shown at 90, by reason of the pressure of the nibs 84 thereunder to rotate sufficiently to become self-aligned with the nearest concavities 80 and to become seated therein. The mica washer 86 is squeezed by the clamping action of the eyelet 88 to conform to the spaces between the respective nibs 84 and the cooperating concavities 80 opposite such nibs 84. The seating of the distended portions 90 of the mica washers 86 in the nearest concavities 80 serves to prevent rotational displacement between the contact cup 42 and the spacer member 46.

The heating element 40 is preferably a ribbon-like strip of suitable electrical resistance alloy having contoured V-shaped cross section, similar to the coil shown in applicant L. G. Horwitz's U.S. Pat. No. 3,235,707. The strip is wound to form a plurality of successive, interlocking convolutions. By reason of the interlocking engagement of each V-shaped convolution with adjacent convolutions, the heating element 40 takes the form of a substantially disc-like member and the interlocking of the successive convolutions resists axial displacement.

The resistance strip which forms the heating coil 40 is preferably made from an alloy containing aluminum and is treated with sufficient heat to cause an aluminum oxide coating to be formed on the surfaces. By reason of the degree of electrical non-conductivity of the aluminum oxide coating, the surfaces of the successive convolutions of the coil, which are in contact with each other, resist current flow or short circuiting between convolutions.

The innermost convolution 92 of the heating coil 40 extends away from the plane in which the intermediate convolutions are wound and toward a slotted rivet 94 and is secured thereto. The rivet 94 is of substantially the same diameter as the opening in the eyelet 88 and is pressed into said opening for frictional engagement therewith. The end 96 of the outer convolution of the coil 40 is secured, such as by brazing or welding, to the inner periphery of the contact cup 42. The end 96 may, of course, be secured mechanically to the contact cup 42 in an electrically conductive manner. The contact cup or shell 42 has a plurality of spaced, inwardly extending projections 98 which are positioned to provide support for the heating element 40 when pressure is exerted against the opposite or frontal side thereof.

When the knob 44 of the igniting unit 10 is pushed inwardly, the contact cup 42 is caused to be grasped by

the bimetallic contact fingers 32. The fingers 32 are connected to a source of direct current, normally a 12-volt automotive battery, through suitable wiring (not shown). The rivet 94, by reason of its engagement in eyelet 88, communicates electrically with the body of the igniting unit 10 and thereby with the tubular holder or socket 12 in which the unit 10 is stored, said socket 12 being electrically grounded. Since the eyelet 88 is insulated by mica washers 86 and 88 from electrical contact with the cup 42, the electrical path, is through the bimetallic fingers 32 to the cup 42 and thereafter from the outermost convolution of the heating coil 40 to the innermost convolution, to the rivet 94 and from the rivet 94 through the body of the igniting unit 10 to the grounded socket 12. The resistance of the heating coil 40 is such that it is heated quickly by the electrical current to a red glow. The heat which is radiated by the heating coil 40 causes the adjacent bimetallic fingers 32 to retract outwardly, thus breaking the electrical circuit and releasing the contact cup 42 from the grasp of the fingers 32. When the cup 42 is released, the compressed coil spring 62 causes the igniting unit 10 to snap back to its normal position within the friction sleeve 38. The force with which the igniting unit 10 snaps back is sufficient to cause the friction sleeve 38 to retract outwardly with respect to the ashguard 36 to the position where it is stopped by the indents 76 projecting into the retraction path of the roll 66. Such retraction serves to recess the contact cup 42 and heating coil 40 within the inner end of the ashguard 36. When the user pulls on the knob 44 to remove the igniting unit 10 from the socket 12, this insures continued retraction of the heating coil 40 and contact cup 42 within the ashguard 36. When the friction sleeve 38 is so retracted within the ashguard 36, the inner end of the ashguard serves as a protective collar around the heating element 40, tending to catch ignited particles of tobacco which may drop from the end of a cigar or cigarette while in contact with the igniting unit 10.

Our improved lighter has been described in the preferred form, but its features are capable of considerable modification without departing from our inventive concept, the scope of which is defined in the claims which follow.

We claim:

1. A low cost, automated-production, automatic electric cigar lighter igniting unit subassembly comprising, in combination:

- a. a plug body having a metal transverse wall at its inner end,
- b. a metal heating element cup aligned with the plug body and having an integral transverse back wall juxtaposed to the transverse wall of said body, said cup being adapted to have secured in it an electric heating element,
- c. a thin smooth-surfaced, deformable insulating wafer disk interposed between said transverse walls,
- d. one transverse wall having at least one nib which is offset from its center and projects toward the other wall,
- e. said other wall having a plurality of closely spaced recesses facing the said one wall and arranged in a substantially circular configuration about its center, each recess being capable of receiving said nib of the one wall, and

f. rivet means passing through said walls and wafer, for insulatedly securing the same in assembled relation,

g. said nib being rounded, the spacing of said recesses being sufficiently close and the wafer being readily deformable when compressed between the transverse walls during assembly of the cup to the plug body whereby the nib and recesses are mutually seeking and effect a rotatable orientation of the cup and body so as to lodge the nib securely in one recess.

2. An igniting unit in accordance with claim 1, and further including a heating element in said cup, wherein said cup is of concave form facing away from said plug body and is provided with spaced, inwardly extending projections positioned to provide support for said heating element when pressure is exerted against the opposite side thereof.

3. An igniting unit in accordance with claim 2 and further including a friction sleeve member and a cylindrical ashguard member, wherein said sleeve member is frictionally engaged for limited axial movement within said ashguard member, one of said members being provided with a plurality of raised longitudinal

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guides in slidable contact with the other member, such one of said members having at least one yieldable friction finger directed toward and contoured to exert frictional pressure against such other member.

4. An igniting unit in accordance with claim 3 wherein said sleeve member has a portion of reduced lateral dimension at the end thereof toward said cup terminating in an outwardly flared portion against which said cup is adapted to bear in normally retracted relation, said outwardly flared portion being of sufficient lateral dimension to guide said sleeve member in axially aligned slidable relation within said ashguard member.

5. An igniting unit in accordance with claim 4 wherein said ashguard member has an inward protrusion substantially aligned with said portion of reduced lateral dimension and interposed in the path of retraction of said outwardly flared portion of said sleeve member so that it limits the retraction thereof within said ashguard member.

6. A low cost, automated-production, automatic electric cigar lighter igniting unit as in claim 1, wherein:  
a. said wafer is constituted of mica.

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