United States Patent [19]

Horwitt et al.

[11] **3,892,944**

[45] **July 1, 1975**

[54] **CIGAR LIGHTER IGNITING UNIT**

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[73] Assignee: **Sun Chemical Corporation**, New York, N.Y.

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[21] Appl. No.: **498,294**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 457,963, April 4, 1974.

[52] **U.S. Cl.** **219/270**; 219/267

[51] **Int. Cl.**[2] **F23Q 7/22**

[58] **Field of Search** 219/260, 261, 262, 263, 219/264, 265, 266, 267, 268, 269, 270, 536, 537

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Primary Examiner—Volodymyr Y. Mayewsky
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[57] **ABSTRACT**

Our invention comprises a "pop-out" igniting unit 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.

2 Claims, 5 Drawing Figures

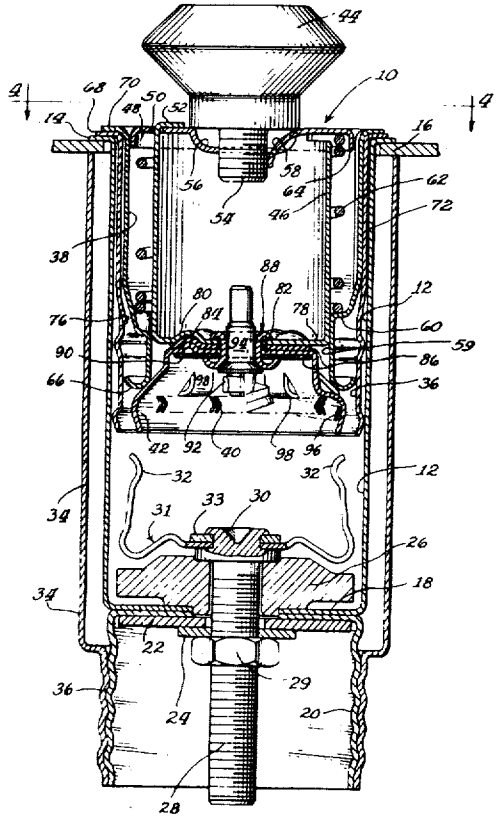


Fig. 1.

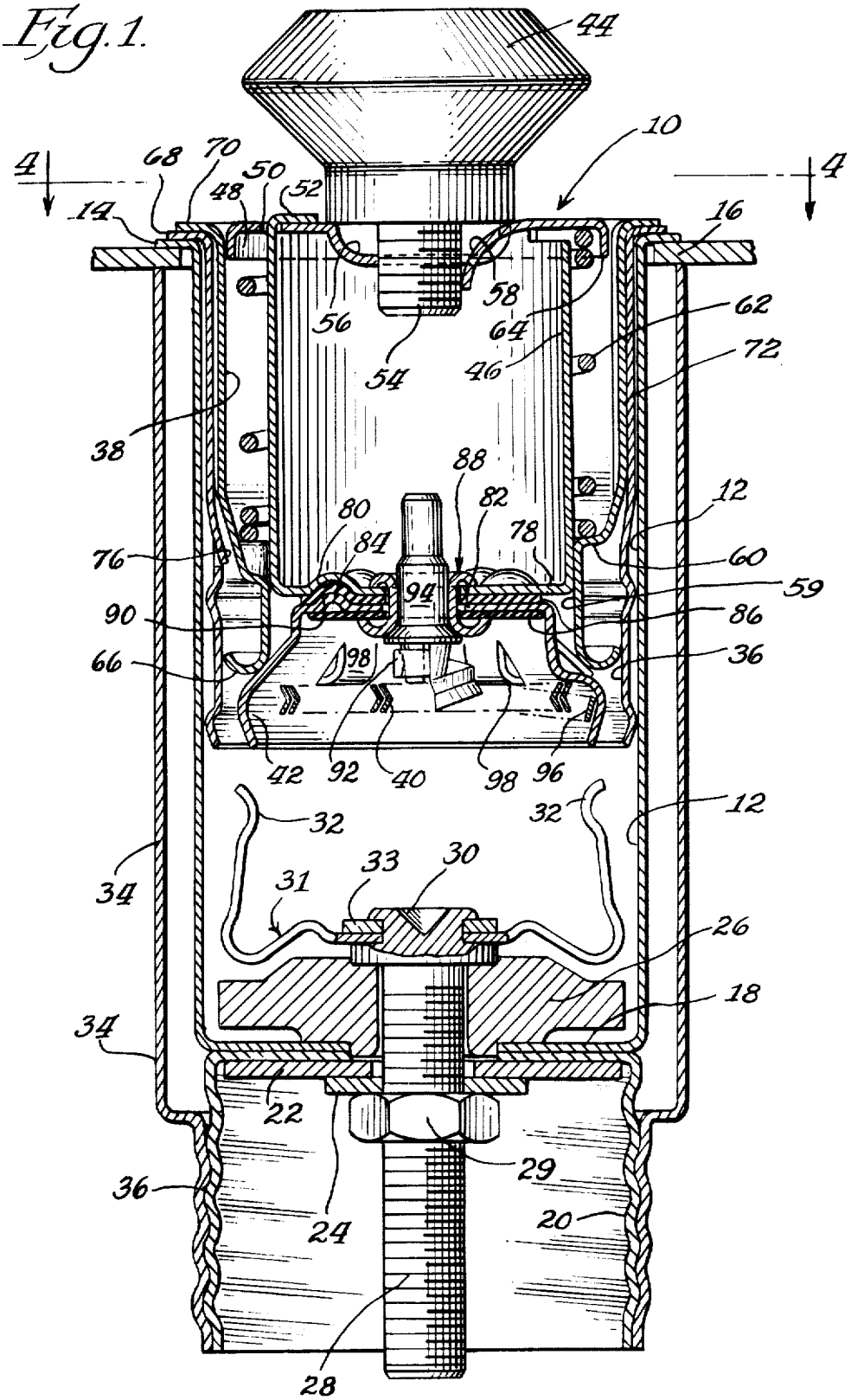

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Fig. 2.

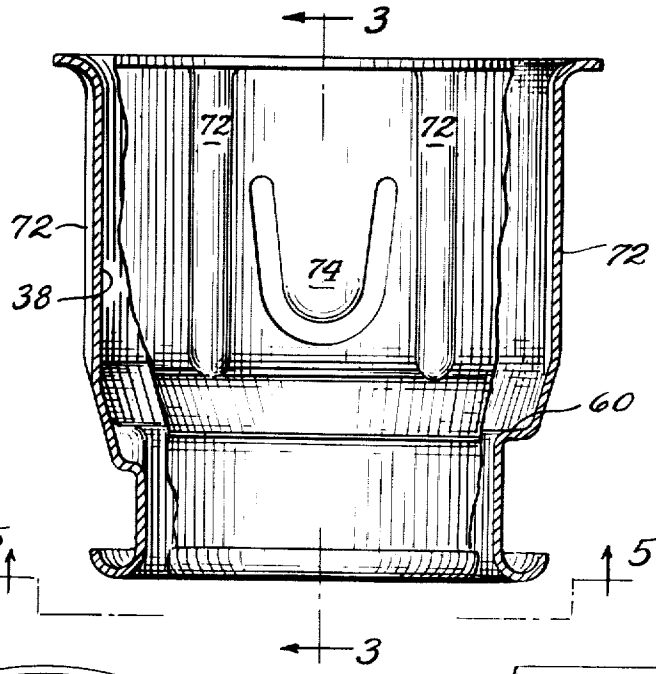


Fig. 4

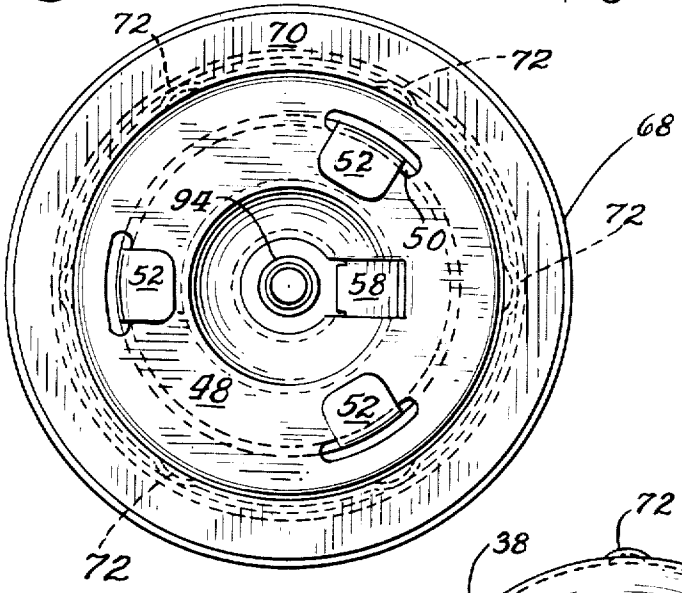
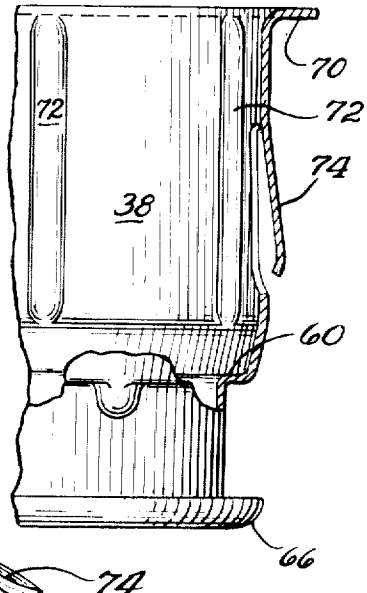


Fig. 3.



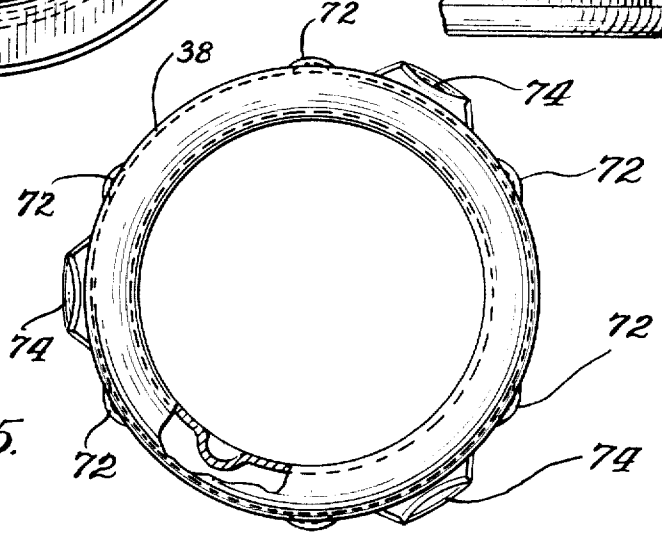


Fig. 5.

CIGAR LIGHTER IGNITING UNIT

The present application is a continuation-in-part of our application Ser. No. 457,963, filed Apr. 4, 1974 and entitled "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 is it 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 or 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 therethrough. 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 neck portion **59** of reduced diameter providing a radially inturned 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 prealignment 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 **38** 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 inturned 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 concavitites **80**. Preferably, there is 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. Horwitt'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. In accordance with the present invention, 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. The projections **98** support especially the outer peripheral portions of the coil **40,** as can be understood. Due to the nesting of the convolutions in each other, the coil has a degree of rigidity whereby the support of the outer convolutions is transferred to the remainder or intermediate coil portions. Thus, the projections increase the ruggedness of the coil and its ability to withstand unusual stresses, as when an unlighted cigar butt is forcibly pressed against it.

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 comprising, in combination:

a. a metal plug body having a stamped, sheet-metal heating element cup insulatedly carried on its inner end, said cup constituting one contact of an electrical heating element circuit and the metal plug body constituting another contact of said circuit,

b. said cup having integral, projecting, heating-element support means formed in its side walls at locations spaced backward from the edge of the cup, and

c. an electrical heating element constituted of spirally-wound resistance ribbon disposed in said cup and having its ends connected respectively to the plug body and cup to be energized therethrough,

d. at least one outer convolution of said element being disposed in front of and closely adjacent the element support means and being adapted to contact the same to provide a back-up for the element when pressure is exerted against the opposite or frontal side thereof,

e. the convolutions of the heating element having a non-linear cross-sectional configuration and interlocking with each other to form a compact, substantially disk-like member the portions of which resist relative axial displacement,

f. said integral, heating-element support means of the cup comprising a plurality of lanced, inwardly-protruding projections engageable with the element at spaced intervals around the circumference of the cup and providing openings in said side walls at the rear of the heating element.

2. A low-cost, automated-production, automatic electric cigar lighter igniting unit as in claim **1**, wherein:

a. the lanced projections of the heating element cup have a curvilinear cross-sectional configuration.

* * * * *