May 10, 1960 F. E. HEUSSER 2,936,358

CIGAR LIGHTERS

Filed Dec. 24, 1956

Fig. 1

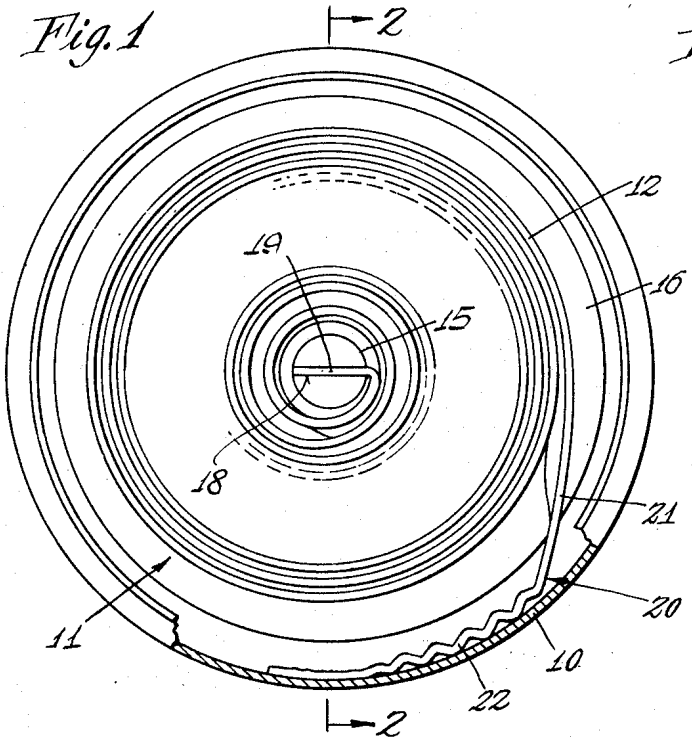


Fig. 2

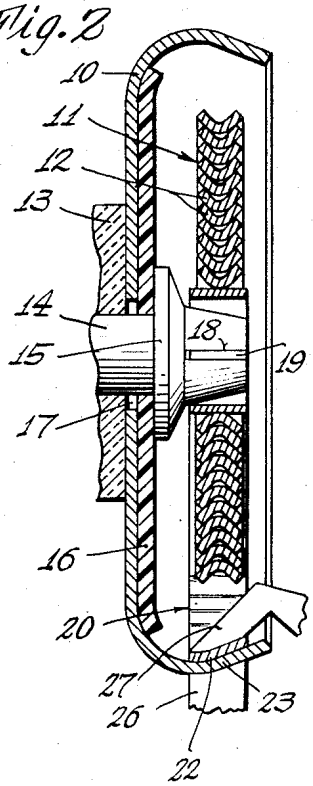
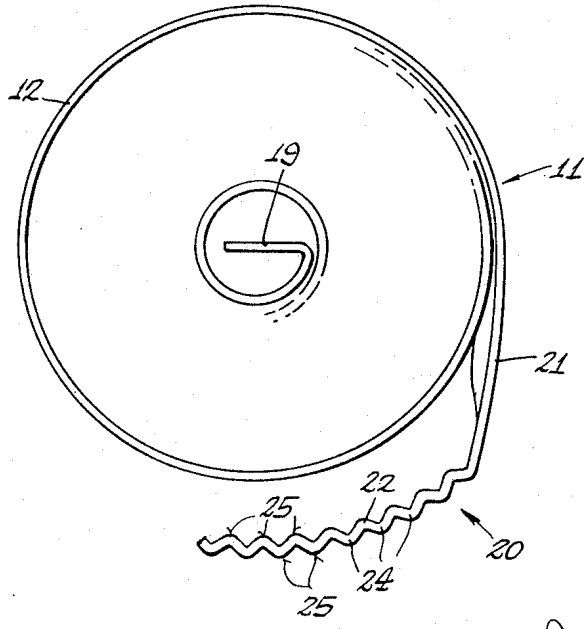


Fig. 3



INVENTOR.
Franklin E. Heusser

BY

Johnson and Kline

ATTORNEYS

United States Patent Office 2,936,358 Patented May 10, 1960

2,936,358

CIGAR LIGHTERS

Franklin E. Heusser, Shelton, Conn., assignor to Casco Products Corporation, Bridgeport, Conn., a corporation of Connecticut

Application December 24, 1956, Serial No. 630,221

3 Claims. (Cl. 219—32)

This invention relates to electric cigar lighters, and particularly to the type having an igniter plug mounted in a socket to be removed for use when the heating element becomes incandescent.

The heating element for such cigar lighters usually comprises a ribbon of resistance wire wound to form a spiral coil and contained within a metal cup to which the outer end of the wire is welded and which forms an electrical contact through which the coil is energized. The inner end of the wire is secured to a current-conducting stud through which the energizing circuit is completed.

The metal of which the heating wire is made is preferably an alloy having the property of forming an insulating coating on the surfaces of the wire when heated, since such a coating avoids sufficient electrical contact between the turns of the spiral to obviate short-circuiting at the points of contact in use.

It is also preferable to heat the coil by extraneous means, such as in a furnace, before the coil is mounted in the retainer cup so that the surfaces of the wire are sufficiently oxidized before the coil is electrically energized.

This procedure, however, creates a problem in the electric welding of the end of the wire to the retainer cup, since the insulating oxide on the end of the wire prevents good contact between the welding electrodes and the wire and between the wire and the cup. Of course, the oxide may be scraped off the wire end by a manual operation, but this is a time consuming and tedious task and would add substantialy to the cost of the cigar lighter.

An object of the present invention is to provide a cigar lighter heating coil which can be made and assembled in the retainer cup with less difficulty and cost than was heretofore possible. This is accomplished by working the outer end of the wire, after the coil is oxidized and before it is welded in the retainer cup as by bending or forming, for instance, by providing the end with transverse corrugations or ripples which cause the oxide coating to be fractured and break off on and adjacent the high points or crests of the rippling and thus provide for metal-to-metal contact and flow of current between the wire and the electrode and the retainer cup, the current flow being concentrated on first engaging the parts at the high points or crests of the ripples and thus producing a rapid heating of the metal. The ripples or corrugations on the end of the wire are also advantageous because when pressure is applied to the wire and cup-wall by the welding electrodes, the ripples tend to flatten out thereby causing them to have sliding engagement with the cup-wall to further improve the electrical engagement of the wire and wall.

The result of the improved heating coil and the method of making it and the heating element containing it is the elimination of faulty heating elements due to poor welds caused by the oxide coating on the wire and this effects a substantial saving in the cost of manufacturing cigar lighters and heating elements used therein.

Other features and advantages will hereinafter appear.

In the accompanying drawings—

Figure 1 is a plan view, partly in section, of a cigar lighter heating element made according to the present invention.

Fig. 2 is a section taken on the line 2—2 of Fig. 1, and showing the position of the welding electrodes after the weld is formed.

Fig. 3 is a schematic view showing the heating coil of the present invention, and particularly the corrugated or rippled outer end of the wire before the coil is assembled in the retainer cup.

Referring to the drawings, the cigar lighter heating element of the present invention comprises a retainer cup **10** within which is mounted a heating coil **11** which comprises a ribbon or strip of resistance material **12** wound in the form of a spiral as indicated in Fig. 1. The retainer cup **10** is supported on a ceramic block **13** forming part of the igniter plug by means of a stud **14** having a head **15** located within the cup. A disk of insulating material **16** is provided between the head **15** and the cup, and the cup is further insulated from the stud by an air gap **17**.

The head **15** has a slot **18** within which the inner end **19** of the resistance wire **12** is placed after which the head is swaged to secure the end **19** in the head. The stud **14** carries current to the coil in the well-known manner when it is desired to energize the coil and bring it to incandescence for use.

The ribbon **12** in the form shown is V-shape in cross section with the apex of the V toward the axis of the spiral. With this formation of the ribbon, when the coil is wound fairly tight the turns or courses of the spiral interlock and prevent axial distortion of the spiral from intended flat condition. This form of resistance wire coil is described and claimed in a copending application of Lawrence E. Fenn, Serial No. 590,132, filed June 8, 1956; but it should be understood that in the broader aspects of the invention the resistance wire may have other forms and the wire may be flat in cross section if desired.

The end **20** of the outer spiral is preferably formed so as to have a tangentially extending portion **21** and a concentrically extending end portion **22** which is to be welded to the flange **23** of the retainer cup **10** which constitutes one terminal for electrically connecting the resistance coil to a source of current to energize the same, the other terminal being the stud **14**.

The metal of which the resistance wire **12** is formed is preferably an alloy having the property when heated of forming on the surfaces of the wire an oxide layer which forms an electrical insulating coating. One suitable metal is an aluminum-iron-nickel alloy such as "Kanthal." The oxide on the surface of the wire electrically insulates the adjacent turns of the spiral from each other so that short circuits between the same do not occur at points of contact of adjacent portions.

It is preferable, after the oil is wound and before it is assembled in the retainer cup, to build up the desired insulating oxide coating on the surface of the wire by heating it externally. This may be done by passing the coils through a furnace or by heating the coils in a high frequency current field. This causes a substantial coating of oxide to be applied to all parts of the wire including the outer end **20** and the inner end **19**.

This preoxidizing of the coil in this manner created a difficult problem, since the insulating oxide on the end **20** of the wire interfered with the electric welding of the end of the flange **23** of the retainer cup to such an extent that there was no assurance that invariably the ends **20** of the coils would be securely welded to the cups. It would be possible, of course, to scrape the end **20** or at least the part thereof on which the welding was to be performed with a knife to remove the oxide from the flat surfaces of the wire, but this would require a hand opera-

tion and, besides being time consuming, would be rather tedious.

To avoid this difficulty, according to the present invention the end **20**, or at least that part of it which is to be welded to the retainer cup, is, in the form shown, provided with transverse corrugations **24** after the coil has been treated to provide the oxide insulating coating. During the corrugation or rippling of the end **22** of the wire, the oxide coating is cracked and chipped off by the stretching, flexing and bending of the wire and exposes the unoxidized metal of the wire over a substantial part of the end **22** and including the high points or crests **25** of the ripples.

Thus, when the end **22** of the wire is placed against the flange **23** of the cup with a welding electrode **26** on the outside of the cup and a welding electrode **27** on the inside surface of the end **22**, the naked crests **25** of the ripples make good electrical contact with the welding electrodes with the result that sufficient welding current can pass through the wire and cup material to heat and weld the engaging parts.

Besides the advantage of displacing the oxide from the end **22** by corrugating it, there is the further advantage that during the initial contact of the electrode **27** with the wire, the welding current is concentrated at the point contacts between the high points **25** and the surfaces of the inner electrode **27** and the inner surface of the side of the retainer cup which results in rapidly heating due to the high resistance produced by the limited contact of the high points with the electrode and the cup.

Another advantage of having the corrugations in the end of the wire is that the continued movement of the electrodes **26** and **27** together tends to flatten out the portion of the end **22** which is engaged by the electrode and in flattening out the ripples a wiping contact between the wire and the cup is obtained, thus making for improved electrical contact between the surface of the wire and the surface of the cup.

It has been found that by making the heating coil with the corrugated or rippled outer end and practicing the method herein described, the production of faulty heating elements due to poor welds caused by the oxide coating on the wire is virtually eliminated, thus effecting a substantial saving in the cost of manufacture of cigar lighters and heating elements used therein.

It was stated above that the inner end **19** of the resistance wire is placed in the slot **18** in the head **15** of the stud **14**. The mechanical attrition attendant upon this operation removes the oxide coating from the inner end of the wire.

When, as shown, the resistance wire has a V shape cross section, the end **20** may be flattened in advance of the corrugating operation or it may be formed as a coincidence to the corrugating operation.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. The method of making a heating element for a cigar lighter comprising the steps of winding into a spiral coil a length of resistance wire, the oxide of which is an electrical insulator, subjecting the spiral coil to heat to cause the formation of a coating of insulating oxide on the surfaces of the wire, flexing the outer end portion of the wire to remove insulating oxide from both surfaces and expose underlying metal for electrical engagement; inserting the spiral coil into a retainer cup; and welding said outer end portion of the wire to the side of the cup.

2. The method of making a heating element for a cigar lighter comprising the steps of winding into a spiral coil a length of resistance ribbon, the oxide of which is an electrical insulator, subjecting the spiral coil to heat to cause the formation of a coating of insulating oxide on the ribbon, corrugating the outer end portion of the ribbon to remove insulating oxide from both sides thereof and expose underlying metal for electrical engagement; inserting the spiral coil into a retainer cup; and welding said outer end portion of the ribbon to the cup.

3. The method of making a heating element for a cigar lighter comprising the steps of winding into a spiral coil a length of resistance ribbon, the oxide of which is an electrical insulator, subjecting the spiral coil to heat to cause the formation of a coating of insulating oxide on the ribbon, corrugating the outer end portion of the ribbon to remove insulating oxide from the crests of the corrugations, inserting the spiral coil in a retainer cup so that the crests of the corrugations engage the side of the cup, applying welding electrodes to the crests of the corrugations and the outside surface of the side of the cup; and applying pressure and welding current to the ribbon and the cup to weld the corrugated portion of the ribbon to the cup.

References Cited in the file of this patent

UNITED STATES PATENTS

515,280	Brown	Feb. 20, 1894
1,229,700	Auel	June 12, 1917
1,944,922	Cohen	Jan. 30, 1934
1,946,434	Bach	Feb. 6, 1934
2,062,701	Cohen	Dec. 1, 1936
2,157,050	Bilger et al.	May 2, 1939