

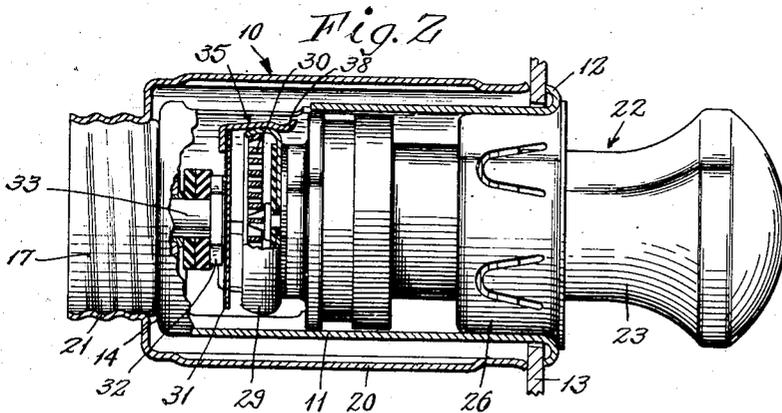
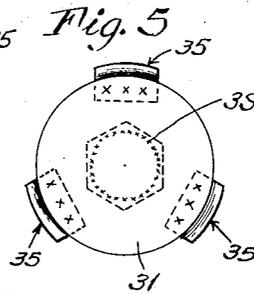
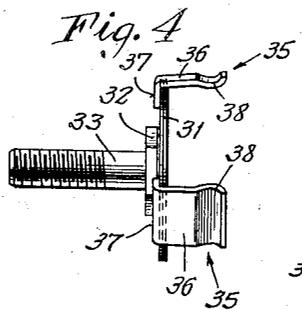
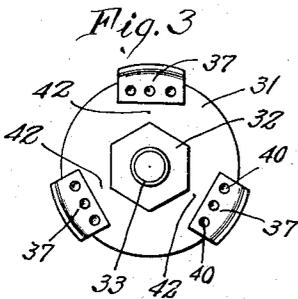
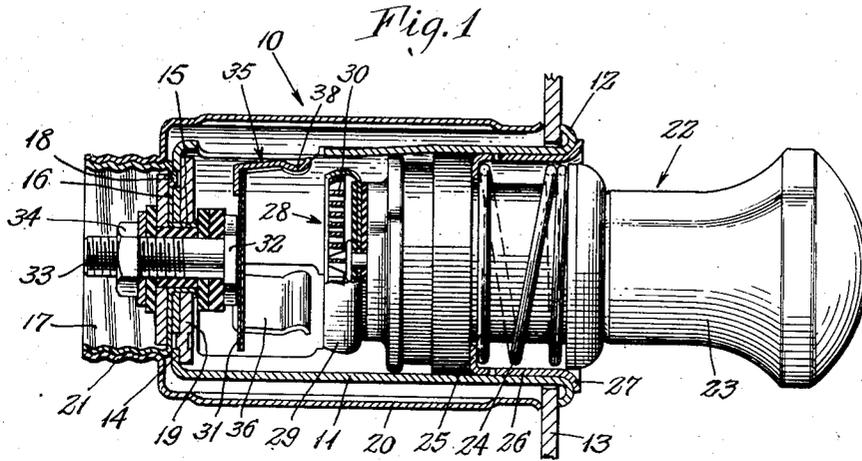
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CIGAR LIGHTER

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## CIGAR LIGHTER

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2 Claims. (Cl. 219—32)

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This invention relates to electric cigar lighters, and more particularly to automatic cigar lighters having thermostatic means for disconnecting the heating element upon its attaining the required incandescence.

Automatic electric cigar lighters, as used in automobiles, commonly have a holding device in the form of a tubular shell which is secured to the instrument panel of the car, the said shell presenting an opening or well in which a removable igniting unit is carried. The igniting unit is movable between energizing and deenergizing positions, and has yieldable means for automatically moving it from the energizing to deenergizing position. The holding device has contact means, generally formed to also provide a latch means, said means including a heat-responsive element whereby the igniting unit is temporarily held in energizing position until the heating element becomes sufficiently hot, and is then released for use, the said release being accompanied by an opening of the circuit through the unit.

In the past the contact and latch means have been formed as a spider having a plurality of arms, generally 3, extending radially from a central portion and then all in one direction substantially parallel to each other, the arms functioning as contacts and also detents. These arms gripped a contact cup surrounding the heating coil, and received heat from the coil through said contact cup and also directly by radiation to a minor degree whereby they flexed outwardly after an interval of heating of the coil, and released their grip on the contact cup. While this arrangement has produced a satisfactory and operative device, many thousands having been produced, sold and put into use, the device was somewhat costly because the bimetallic clip, after its fabrication and forming, at times required subsequent qualifying or calibrating operations. Thus it was not possible to simply fabricate the bimetal and assemble it in the lighter, and still have assurance that all such lighters would function unerringly and properly. This condition constituted a drawback since it meant that the lighters had to be individually tested, if perfect performance and reliability was required. Lighters which were tested and found to be defective in operation required readjustment of the bimetallic thermostat, and such testing and readjustment resulted in the cost of the lighter being substantially increased.

An object of the present invention is to provide an improved bimetallic thermostat for a cigar lighter of the above type, which thermostat after initial fabrication and forming has uniform and reliable operating characteristics whereby it need not be subjected to subsequent qualifying operations or readjustments. As a result, cigar lighters having the improved thermostat of this invention

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may be completely fabricated and sold without further testing, since assurance is now had that the lighter will operate satisfactorily and in the intended manner.

In the prior type lighters described above it was possible to obtain only three or four repeat lights, after which the thermostatic element became so heated that it would not function satisfactorily to produce the desired degree of incandescence in the heating element.

Another object of the present invention is to provide an improved bimetallic thermostat which will enable many more repeat lights to be obtained before the thermostatic element reaches a condition where it will no longer fully energize the heating element. Bimetal thermostats made in accordance with the present invention enable as many as twelve repeat lights to be had, as compared with the three or four repeat lights of prior lighters.

Still another object of the invention is to provide an improved bimetallic thermostat as characterized above, which is extremely simple in structure and economical to fabricate and assemble.

In accomplishing the above objects there is provided, in accordance with the invention, a novel thermostat in the form of an automatic heat-responsive latch and switch means comprising a circular disk of bimetal secured at its center portion to a supporting stud on the holding device, the peripheral portions of the bimetal disk having attached to them monometallic contact and latching arms which extend or project from one side of the disk. Preferably the bimetal disk is secured to the supporting stud by a welding operation and the monometallic arms secured to the peripheral portions of the disk by another welding operation. I have found that, contrary to expectations, a bimetallic disk when employed as above, in spite of its small size and its small or short active portions, and in spite of the adverse influence of the heat accompanying the welding operations, produces an extremely reliable thermostatic device which is uniformly accurate in its response to heat and which does not require adjusting or qualifying operations subsequent to its fabrication.

In the specific structure herein provided by the invention the active portions of the bimetallic disk, which are located between the base portions of the latching and contact arms and the support portion or head of the stud, constitutes a very small proportion of the entire area of the disk, and the length of such active portions is generally less than one-sixth the diameter of the disk and closely approaches one-seventh the disk diameter. In spite of this seemingly unfavorable ratio between the active portions of the disk and the overall disk area, the resulting thermal re-

sponse is extremely uniform and reliable, and is adequate to cause the arms to properly release the igniting unit when the disk is hot, and to latch the igniting unit when the disk is cold.

Thermostatic lighters of the type under consideration have small-diameter wells in the neighborhood of  $\frac{3}{4}$  of an inch, necessitating thermostatic elements of correspondingly small size. I have found that even though the thermostatic disk of the present invention has a diameter as little as  $\frac{1}{8}$  of an inch, and has active portions between the head of the supporting stud and the base portions of the contact arms with a length of at the most  $\frac{1}{8}$  of an inch and in some cases less, a satisfactory latching and releasing action is had which is extremely uniform at all times and which does not require calibrating operations subsequent to fabrication of the thermostat unit. By this organization therefore I have succeeded in attaining an economy and reliability in the manufacture of cigar lighters which was not heretofore obtainable. Furthermore, I have found that by such a construction it is possible to obtain consistently as many as twelve repeat lights, whereas heretofore three or four repeat lights was considered the maximum obtainable from the best-designed bimetallic thermostats.

By the use of a bimetallic disk, as provided by the present invention, carrying monometallic contact arms on its peripheral portions, a saving of bimetal is effected, and as a result of the welding operations the assembly of the component parts may be quickly and economically effected, thereby holding the cost of the thermostatic unit down to a low value.

In securing the bimetallic disk to the head of the supporting stud a circular weld is provided which substantially inactivates the central portion of the disk. In spite of this, however, the performance of the thermostat as formed in accordance with the invention has been found to be outstandingly satisfactory for use in cigar lighters, and the strength of the weld found to be adequate for all strains arising in the disk.

I have found that the monometallic contact arms may be advantageously formed of a copper-nickel alloy known commercially as Cupron containing approximately 55% copper and 45% nickel. Arms formed of this alloy provide for reliable operation of the cigar lighter over an extended period of time, since I have found that such arms are resistant to pitting, rusting and corrosion, and have high electrical and heat conductivity. The arms may be made of metal having any desired thickness, since the metal thickness does not affect the flexing of the bimetal disk. Also, the disk may be made relatively thin to obtain the desired deflection characteristic without adversely affecting the rigidity and latching action of the contact arms. The bimetal disk has been found to flex evenly under the action of heat, and therefore the latching arms will separate uniformly and simultaneously from the cooperable portion of the igniting unit as the disk heats up, resulting in a reliable releasing operation at all times. The bimetal disk is preferably located directly in front of the heating coil and therefore has transmitted to it a substantial amount of heat by direct radiation, with relatively little loss. Therefore the disk may be operated at a higher temperature and will flex with more positiveness than prior thermostats.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

Figure 1 is an axial sectional view of a cigar lighter and heat-responsive latch-and-contact means made in accordance with the invention, the igniting unit being shown in deenergizing position.

Fig. 2 is a view similar to Fig. 1 but showing the igniting unit in energizing position.

Fig. 3 is a rear elevational view of the thermostatic element or unit of the invention.

Fig. 4 is a side elevational view of the thermostatic element, and

Fig. 5 is a front or face view of the thermostatic element.

As shown, the improved cigar lighter and thermostat of this invention comprises a holding device 10 in the form of a tubular metal shell 11 having an outturned flange 12 at its mouth for engagement with the outer surface of a supporting instrument panel 13. The shell 11 has a rear transverse wall 14 which is apertured to receive a tubular extension 15 in the bottom 16 of a metal cup 17 having a rolled thread in its side walls. The bottom 16 of the cup 17 engages the transverse wall of the shell 11 and is keyed thereto by the provision of a nib 18 projecting into an aperture in the wall 14 as shown. The inner side of the wall 14 is engaged by a washer 19 which is similarly keyed to the wall and which is held in place by laying over the end of the extension 15 on the washer. A tubular clamping shell 20 is provided, surrounding the holder shell 11 and engaging the rear surface of the supporting panel 13, the clamping shell having a portion 21 of reduced diameter provided with rolled threads by which the clamping shell may be threaded on the cup 17 and made to tightly press against the instrument panel 13.

The cigar lighter has a removable igniting unit 22 provided with a knob 23 and a compression spring 24 engaging an inturned flange 25 of a shell 26 which also has an outturned flange 27 for engagement with the flange 12 of the holder shell 11. When the igniting unit 22 is moved from the shallow position of Fig. 1 into the deep energizing of Fig. 2 the spring 24 is compressed, and if the igniting unit is not held in its deep position the spring will automatically move the unit from the position of Fig. 2 back to the position in Fig. 1. The igniting unit 22 has the usual heating element 28 provided with an encircling metal contact cup 29 through which energization of the heating coil 30 of the heating element is effected.

In accordance with this invention an improved automatic heat-responsive latch-and-switch means is provided on the holder 10 for engagement with the igniting unit 22, specifically for engagement with the metal contact cup 29 of the heating element 28. This improved latch-and-switch means comprises a bimetallic disk 31 carried on the head 32 of a metal stud 33 which latter is insulatedly carried by the rear transverse wall 14 of the holder shell 11. The stud 33 is held in place by a nut 34 threaded on its shank, and electrical connection (not shown) to the stud 33 may be effected in the usual manner.

The bimetallic disk 31 has secured to its peripheral portions monometallic latching-and-contact arms 35, each arm comprising a main or body portion 36 supported by an angularly bent base portion 37 which is secured to the disk 31. Each monometallic contact arm 35 has a free end portion 38 which is formed to be concavo-convex, 75 and is also rounded or ribbed as shown in Figs.

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3, 4 and 5. The free end portions 38 and the body portions 36 of the contact arms 35 are adapted to engage and grip between them the contact cup 29 of the heating element 28, and preferably, as indicated in Figs. 3 and 5, the assembly of the bimetallic disk 31, stud 33, and contact arms 35 is effected by welding operations. In accomplishing this, the head 32 of the stud 33 is provided on its face with a circular raised rib (not shown), and when the stud is welded to the bimetallic disk 31 a circular weld 39, Fig. 5, will result. The base portions 37 of the arms 35 are provided with nibs 40 which result in a plurality of spot welds, Fig. 5, when the arms are welded to the peripheral portions of the disk 31.

I have found that, contrary to expectations, the provision of the relatively small bimetallic disk 31 with extremely short active portions 42 between the head 32 of the stud 33 and the bases 37 of the contact arms 35, produces an extremely satisfactory and reliable thermostatic element which does not necessitate qualifying or subsequent adjustment operations after its fabrication, in spite of the adverse influence of the heat of the welding on the disk 31. By obviating the necessity for qualifying operations subsequent to fabrication and forming of the thermostatic element shown in Figs. 3, 4 and 5 I have effected a considerable economy in the cigar lighter while at the same time increasing the quality and reliability of the device. In addition, I have found it possible to obtain with my improved thermostatic element as many as twelve repeat lights, whereas the highest number of repeat lights previously obtained with the best of the prior thermostatic elements was three or four. Moreover, by the use of the monometallic contacts 35 and the bimetallic disk a saving of bimetal is effected over the prior structures where the arms and center were formed of a single piece of bimetal.

It will be seen that the active portions 42 of the disk 31 form an extreme small part of the overall area of the disk, and in length are approximately  $\frac{1}{4}$  of the diameter of the disk. The disk 31 may itself be of relatively small diameter, as in the neighborhood of  $\frac{1}{16}$  of an inch, and the distance between the base portions 37 of the arms 35 and the head 32 of the stud 33 may be less than  $\frac{1}{16}$  of an inch without adversely affecting the high efficiency and performance of the assemblage. By the provision of the circular weld 39 the disk 31 is securely mounted on the stud 33 and will not become detached therefrom because of the strains to which the disk may be subjected in flexing. While the circular weld 39 substantially inactivates the central portion of the disk contained within the weld, I have found that this does not detract from the reliability of the thermostat.

When the igniting unit 22 is moved to the deep energizing position shown in Fig. 2 the bimetallic disk 31 will receive heat from the heating coil 30 by direct radiation therefrom with relatively, little loss, and it will be noted that the heating coil and disk are in close proximity to each other. I have found that with such an assemblage a bimetal may be used which requires a higher heat to effect a given deflection than the heat heretofore required in bimetallic thermostats of cigar lighters. The bimetal disk 31 may be made relatively thin, whereby its deflection characteristics are enhanced, and the latch and contact arms 35

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may be formed of thicker metal and of a metal which is more suitable for contact purposes than the disk 31, thus further increasing the effectiveness of the thermostat.

I have found that the copper-nickel alloy known commercially as Cupron which contains approximately 55 per cent copper and 45 per cent nickel, when used for the arms 35 is particularly advantageous, due to its non-pitting, non-rusting, non-corrosive properties and high electrical and heat conductivity.

By the provision of the bimetal disk 31 and monometallic arms 35 secured thereto I obtain an advantageous uniform opening movement of the arms when the disk is heated, and I attribute this to the non-flexing characteristic of the arms plus the uniform flexure of the disk. Since the disk is of small diameter, and has confined active portions of small area and length, the flexure of the disk is not great, and the arms by their length provide a lever action which produces the reliable and uniform performance mentioned above, without recourse to qualifying operations or adjustment subsequent to forming and assembling the disk, arms and stud.

The location of the disk 31 in front of the heating coil, plus its relatively large area, results in the disk receiving a substantial amount of heat with but little loss, and therefore the disk operates at a higher temperature than prior thermostats, and consequently with more positiveness.

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

I claim:

1. In an electric cigar lighter, a holder for supporting an igniting unit for energization and for complete removal therefrom for use; a stud carried by the holder; and automatic, heat-responsive latch-and-switch means carried by said stud and engageable with the igniting unit, said means comprising a bimetallic disk welded along a centrally-located circle to the stud and located to receive heat from the igniting unit, and comprising a plurality of monometallic latching contact arms extending from a side of said disk, each arm having one end bent at an angle and secured to a peripheral portion of the disk and having the other end free, said other end swinging one way or the other in response to heating or cooling respectively of the disk.

2. An electric cigar lighter as claimed in claim 1 in which said arms are formed of a copper-nickel alloy containing approximately 55 per cent copper and 45 per cent nickel, and wherein said one end of each arm is secured to the corresponding peripheral portion of the bimetallic disk by welding.

JOSEPH YOUHOUSE.

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