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CONTACT TERMINAL

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My invention relates to electrically heated devices and particularly to resilient contact members for such devices.

An object of my invention is to provide a resilient contact clip to be used in connectors for electrically heated apparatus that shall have low contact resistance and high resiliency at elevated operating temperatures.

In practicing my invention, I provide a resilient contact clip adapted to fit over and around a terminal pin, the clip being made of a relatively heavy outer layer of Monel metal or stainless steel and an inner relatively thin layer of a noble metal, such as silver.

In the single sheet of drawing:

Figure 1 is a view, partially in side elevation and partially in section, of an electric iron with which is associated a device embodying my invention,

Fig. 2 is a top plan view of a contact clip embodying my invention,

Fig. 3 is a view, in side elevation, of the contact clip shown in Fig. 2.

Figs. 4 and 5 are end elevational views of the clip, as viewed from opposite ends, and,

Fig. 6 is a view, in lateral section, taken on the line VI—VI of Fig. 3.

As was hereinbefore stated, the device embodying my invention is particularly applicable to, and useful in, electrically heated appliances in which the cooperating contact clip and terminal pin must operate at relatively high temperatures, a representative appliance of this kind being an electric smoothing iron. The contact clips heretofore used have been made of brass, bronze, or plated steel but, in my experience, such contact clips did not have the desired relatively long period of useful life when operated continuously, or, at least, for many hours per day.

Thus, in the case of an electric flat iron operated for, say, 8 hours each working day in a laundry, the terminal pins will be subjected to a relatively high temperature after the first one or two hours of operation. If one of the hereinbefore mentioned metals has been used in the contact clips, there may be a tendency toward loss of elasticity at the higher temperatures, with the result that the contact pressure between the clip and the pin will be reduced, and the contact resistance between them will be increased. This results in local heating which causes a still further increase in the temperature of the terminal pin and of its engaging contact clip, with loss of elasticity in the spring contact member. Added to this, pitting and corroding may occur which

will finally result in an open circuit and necessitate the replacement of the clips.

In other metals heretofore used, the contact resistance between the clip and the terminal pin was inherently high, and any oxidation of the surfaces in engagement only increased the already relatively high contact resistance, with the same general result as hereinbefore set forth, viz. that of overheating and loss of elasticity.

I have elected to illustrate the device embodying my invention as applied, more particularly, to an electric flat iron, although, of course, its use is not limited thereto.

An electric flat iron 11 includes a base plate 12, a top plate 13 and a heating unit 14 clamped between them by a plurality of clamping bolts 16, only one of which is shown in the drawing. The iron includes, further, a cover 17, handle straps 18 and 19 and a handle 21 supported by the straps. The cover is clamped against the top of the base plate 12 by a bolt 22. All of these parts are illustrated generally only and I do not desire to be limited to the particular details of construction so illustrated.

A pair of terminal straps 23, only one of which is shown in the drawing, are provided for the ends of the resistor wire constituting a part of the heating unit 14, and terminal pins 24 are secured to the upper ends of the straps 23. The pins 24 extend outwardly through an apertured member 26 of high-temperature-resisting and electric-insulating material, one portion of which extends outwardly through an opening 27 in the rear portion of the cover 17. A terminal-pin guard 28, of usual construction, is secured against the outside surface of strap 19 to guide and hold a contact-plug assembly 29 in the usual manner.

The contact plug 29 includes two cooperating casing portions 31 and 32 suitably secured together and recessed within to receive and properly support a pair of contact clips 33.

One end of a supply-circuit conductor 34 extends into the plug 29, and the ends of its two conductors are respectively connected to the contact clips 33 by short screws 36. A spring 37 surrounds the conductor 34 for a short portion of its length outside of the plug 29 to prevent undue kinking or bending thereof.

Referring to Figs. 2 to 6, inclusive, I have there illustrated one form of resilient contact clip embodying my invention, although the inventive idea is not limited to this particular form and construction. As shown in Fig. 3, I provide two resilient members 38 and 39 which have

substantially flat portions 41 which are in close engagement and are held therein by overlapping integral lugs 42. At intermediate portions of their lengths, the members 38 and 39 are bent outwardly and then approach each other and are provided with outwardly flaring mouth portions 43 and 44 in order that the clips may easily be forced into operative engagement with a co-operating terminal pin 24.

As shown more particularly in Fig. 6 of the drawing, each of the members 38 and 39 comprises two layers of metal, the outer layer 46 being of some such high-temperature-resisting metal as Monel or stainless steel which will not lose its elasticity at the relatively high temperature of 300° F. to 400° F. at which the clips must operate. An inner layer 47 of an oxidation-resisting noble metal, such as silver or gold, is intimately united with the layer 46 and, as an example of the relative thicknesses, I have found that a layer of silver of .002 inches to .005 inches united with a layer of Monel .024 inches thick will have an indefinite length of life. Tests thus far made on contact clips of this kind in daily use for 8 hours, more or less, per working day have shown no loss of resiliency and no increase of contact resistance even after many months of use, whereas, heretofore, it had been necessary to replace the ordinary contact clips within relatively short periods of time, measured more particularly in weeks.

The double-layer resilient members 38 and 39 cannot be considered as bimetal elements, as usually so designated, because the coefficients of expansion of the two metals utilized are substantially the same, and such small difference as may exist cannot cause deflection by different temperatures, as the ratio of the thickness of the layer of Monel metal to that of the layer of silver is very great and, further, the mechanical strength of the Monel metal is very much greater than that of the silver or other metal.

I may say that I prefer to roll the layer of silver or other metal into intimate engagement

with the layer of Monel metal, in order to have a relatively hard dense layer of silver or other metal which cannot always be obtained by electro-deposition.

Since various modifications may be made in the device embodying my invention without departing from the spirit and scope thereof, I desire that only such limitations shall be placed thereon as are imposed by the prior art or are set forth in the appended claims.

I claim as my invention:

1. A contact clip for operation at relatively high temperature, said clip including a terminal-gripping member having a relatively thick backing of Monel metal and a thinner facing of a noble metal of substantially the same width and length.

2. A contact clip to fit on a terminal pin, said clip including a resilient terminal-gripping member having a relatively thin layer of silver operatively engaging the terminal pin and a unitary outer thicker layer of Monel metal, the thickness of the Monel metal layer being at least four times that of the silver.

3. A device as covered by claim 1, characterized in that the thickness of the Monel metal is from about five times to twelve times the thickness of the noble metal.

4. A device as covered by claim 1, characterized in that the thickness of the Monel metal is from about five times to twelve times the thickness of the noble metal and that the two layers are intimately united.

5. A terminal-gripping member having a relatively thick backing of Monel metal and a thin facing of gold.

6. A contact clip, as set forth in claim 2, in which the two layers are intimately united with each other.

7. A terminal-gripping member having a relatively thick backing of Monel metal and a thin facing of a noble metal.

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