June 16, 1931. O. J. FAY ET AL 1,810,164

HEATING DEVICE

Original Filed Dec. 23, 1927

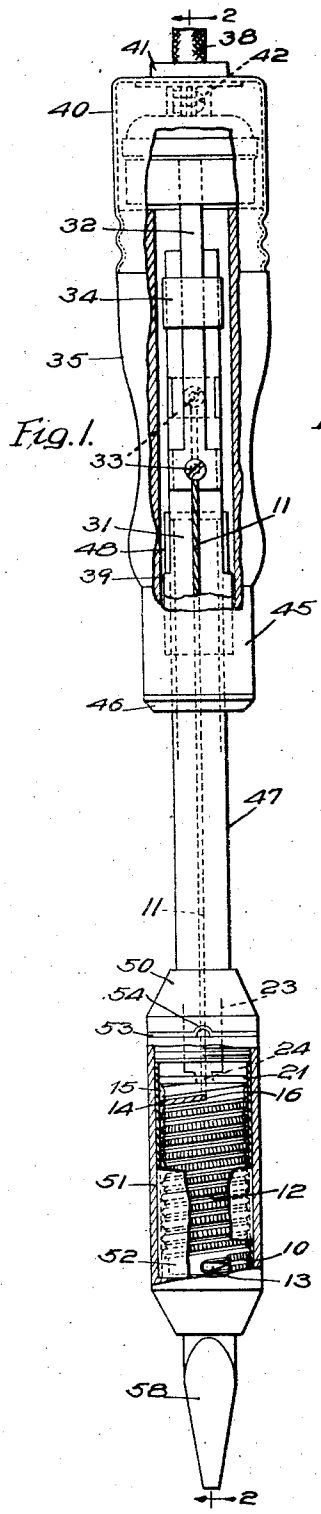


Fig. 1.

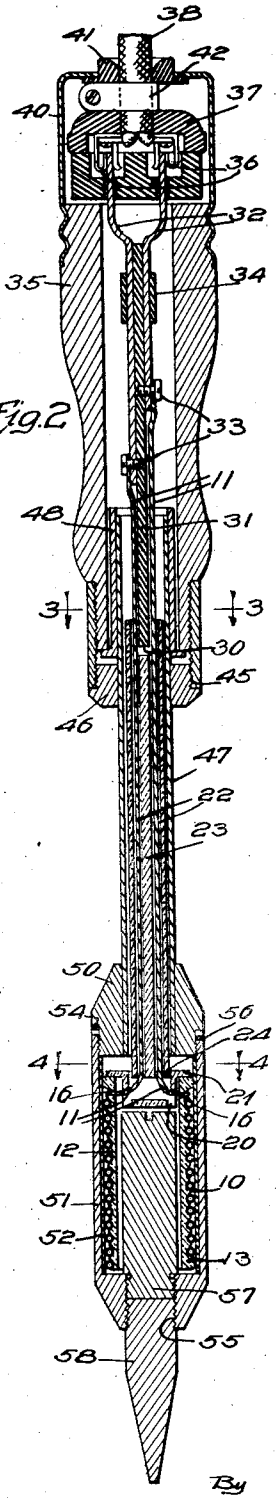


Fig. 2.

Fig. 3.

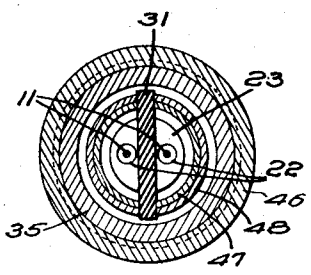


Fig. 4.

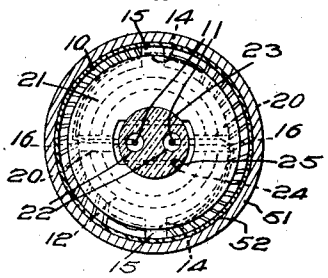


Fig. 5.

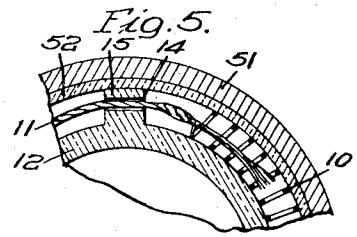
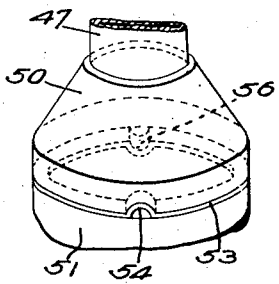


Fig. 6.



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UNITED STATES PATENT OFFICE

OWEN JAMES FAY, OF CHICAGO, HARRY TOBIAS HEIMBERGER, OF RIVERSIDE, AND EMERSON PUGH, OF DOWNERS GROVE, ILLINOIS, ASSIGNORS TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

HEATING DEVICE

Original application filed December 23, 1927, Serial No. 242,046. Divided and this application filed March 30, 1929. Serial No. 351,172.

This invention relates to a heating device, and more particularly to an electrically heated soldering iron, and is a division of our Patent No. 1,726,658 of September 3, 1929.

The object of this invention is to provide an improved heating element of simple and durable construction for use with electrical heating devices.

A preferred embodiment of the invention consists of a heating element comprising a helically formed resistance wire wound in a double spiral from a loop therein upon a grooved cylinder of refractory material surrounding a solid heat conducting core of a soldering iron. The leads or integral connecting portions of the heating element have twisted therewith a plurality of electrical conducting strands extending inside a plurality of the convolutions of the resistance wire and held in a predetermined position by passing the twisted leads through apertures in diametrically opposite protruding portions of the refractory cylinder. These twisted leads having increased conductivity extend through the handle of the soldering iron and are connected to a source of electrical energy.

Other objects will appear more clearly from the following detailed description of one embodiment of the invention, taken in connection with the accompanying drawings, in which

Fig. 1 is a longitudinal elevation, partly in section, of a soldering iron embodying the features of the invention;

Fig. 2 is a sectional view taken on lines 2—2 of Fig. 1;

Fig. 3 is an enlarged cross-sectional view taken on lines 3—3 of Fig. 2;

Fig. 4 is an enlarged cross-sectional view taken on lines 4—4 of Fig. 2;

Fig. 5 is an enlarged fragmentary detail view of the resistor winding showing the reinforced wire terminals thereof, and

Fig. 6 is an enlarged fragmentary perspective view disclosing a means for locking the metal shell encasing the heating unit to the stem assembly of the handle.

Referring now to the drawings wherein like reference numerals refer to similar parts throughout the several views, the numeral 10 designates a heating element of any suitable high resitance electrical conducting material formed into a helix with a straight lead 11 on each end. The helically formed resistance wire 10 is wound in a loop over a helically grooved cylinder 12 constructed of any suitable refractory insulating material, starting around a protruding post 13 at the forward end of the refractory cylinder 12 as illustrated in Fig. 1. The helices are so spaced that they are out of contact with each other, thus preventing a short circuit which would render part of the resistor ineffective to generate heat. In order to strengthen the leads and to increase their conductivity thereby minimizing the generation of heat in the leads, three extra wires are inserted a short distance inside the helix and are twisted with a lead to form a reinforced stranded terminal. This feature assists in keeping the handle from becoming hot since the reinforced leads having a lowered resistance do not generate any appreciable amount of heat. The leads 11 of the resistor 10 are threaded through apertures 14—14 in protruding portions 15 diametrically opposite each other at the upper end of the insulating cylinder 12 and then through holes 16 to the interior of the insulating cylinder 12.

From the inside of the insulating cylinder 12 the leads 11 are passed through slots 20 into a substantially rectangular shaped depression 25 in an insulating cap 21 and from there through separated longitudinal passageways 22 in an insulating stem of refractory material 23 having a substantially rectangular end 24 which fits into the substantially rectangular depression 25 in the cap 21 and is thus interlocked with the cap. The other end of the stem insulator 23 is provided with a rectangular slot 30 into which an insulating strip 31 fits carrying a connector bar 32 on either side and having screws 33—33 by means of which the leads 11 of the resistor 10 are secured thereto. The connectors are crimped over the edges of the strip 31 and in addition are secured

by the screws 33 and an insulating band 34, and they extend out of and beyond the end of a wooden handle 35 so that electrical supply terminals 36 in a socket 37 can be engaged with the connectors 32. The socket terminals may be connected through a cord 38 to a suitable source of electrical energy.

A detachable retaining cap 40, which may be of any suitable metal, threaded on the handle 35 is adapted to rigidly maintain the electrical supply socket 37 in contacting position. The retaining cap carries a hard rubber or fiber washer 41 through which the cord 38 passes and the washer 41 abuts with a clamp 42 which firmly grips the electrical supply cord and relieves the terminals 36 in the socket from strain. That is, if the electrical supply cord 38 is subjected to a longitudinal pull, the strain is taken up by the clamp 42 as it bears against the washer 41 held in place by the cap 40, thereby preventing the cord from being torn from the terminals 36 in the socket 37.

The lower end of the handle 35 is threaded into a metallic collar 45 which in turn is threaded onto a member 46 forcibly driven on a metallic tube 47 surrounding the stem insulator 23. A flanged sleeve 48 having a slot extending through the flange and longitudinally thereof, fits over the metallic tube 47 and the insulating strip 31 which has a widened portion 39 (Fig. 1) extending through a slot in the tube 47 and the slot in the sleeve 48. The flange of the sleeve 48 bears against the end of the handle under the collar 45 and serves to rigidly interlock these members and prevent an accidental withdrawal of the insulating strip through the opening in the end of the handle. At the lower end of the metallic tube 47, a thimble 50 is forcibly driven thereon and has a threaded end on which is screwed a metal shell 51 encasing the heating element 10 and separated therefrom by a mica cylinder 52. A thin metal washer 53 is placed between the shoulder of the threaded part of the thimble 50 and the metal shell 51 screwed thereon. The washer is adapted to interlock the thimble and shell when the washer is driven into semi-circular slots 54 and 56 in the shell and thimble as shown in Fig. 6 of the drawings. The shell 51 also has a threaded circular opening 55 for receiving a heat conducting core 57 inserted inside the resistor supporting cylinder 12 and a copper soldering tip 58 which abuts against the end of the core 57. The contact between the core 57 and the soldering tip 58 expedites the conduction of heat from the heating element 10 to the soldering tip.

The soldering iron is compact and comprises relatively few parts, each of which is removable as a unit, so that with the above described construction it is an easy matter to replace any particular part or parts without discarding the entire iron. The ease and quickness with which the unit may be disassembled will be clearly apparent from the following description: To disassemble the soldering iron, the retaining cap 40 is detached from the handle and the electrical socket 37 removed therefrom. The handle 35 with its collar 45 may be unscrewed from the member 46 of the tubular assembly 47 and withdrawn over the insulating strip 31 and connectors 32. This gives access to the screws 33 on the connectors so that the leads 11 can be released from under the screws, thereby permitting the removal of the insulating strip 31, connectors 32 and flanged sleeve 48. The metal shell 51 is removed by driving the washer 53 out of the slots 54 and 56 restoring it to its originally flat condition and unscrewing the shell from the thimble 51 carrying with it the heat conducting core 57 and soldering tip 58. The heating element 10 with its leads 11, supporting cylinder 12 and insulating cap 21 are pulled away from the stem insulator 23 which may be very easily removed from the tube 47. Any part can now be readily replaced and the iron can be expeditiously reassembled ready for use.

Although the invention as herein described and illustrated is particularly well adapted to an electric soldering iron, it should be understood that the invention is adaptable to other electrically heated devices and should be limited only by the scope of the appended claims.

What is claimed is:

1. In an electrical heating device, a heating element wound in a helix, and a strand extending inside a convolution of the heating element and twisted with a connecting portion of the heating element for increasing the strength and conductivity of the portion.

2. In an electrical heating device, a coiled heating element, and a strand extending inside the convolutions of the coiled heating element and twisted with a connecting portion of the heating element for increasing the strength and conductivity of the portion.

3. In an electrical heating device, a coiled heating element wound in a helix, leads for the heating element, and a plurality of strands extending inside a plurality of the convolutions of the coiled heating element and twisted with a lead of the heating element for increasing the strength and conductivity of the lead.

4. In an electrical heating device, a heating element wound in a helix, a strand extending inside the convolutions of the coiled heating element and twisted with a portion of the heating element for increasing the strength and conductivity of the portion,

and insulating means for supporting the heating element.

5. In an electrical heating device, a hollow refractory cylinder having spiral grooves in the periphery thereof, a helical heating element wound in a double spiral in the grooves, means integral with the cylinder for holding the loop of the coil at the forward end thereof, a plurality of strands extending inside a plurality of the helices of the heating element and twisted with a portion of the heating element for increasing the strength and conductivity of the portion, and a protruding portion integral with the cylinder and having an aperture for receiving and holding the twisted portion of the element in a predetermined position.

6. In an electrical heating device, a coiled heating element wound in a helix, a lead for the heating element, and a plurality of strands twisted with the lead of the heating element short of the ends thereof and the ends of the strands extending within a plurality of the convolutions of the coiled heating element for increasing the strength and conductivity of the lead.

In witness whereof, we hereunto subscribe our names this 22nd day of March, A. D. 1929.

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EMERSON PUGH.