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ELECTRICAL HEATING UNIT

Filed Oct. 20, 1923

Fig. 1

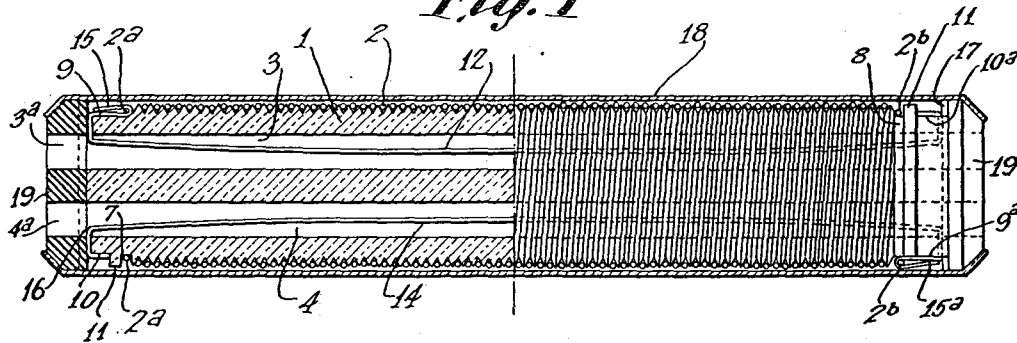


Fig. 2

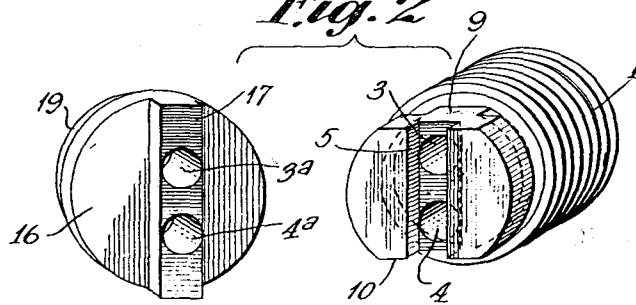


Fig. 3

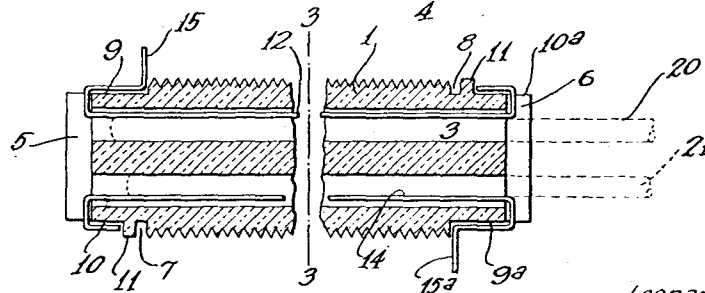
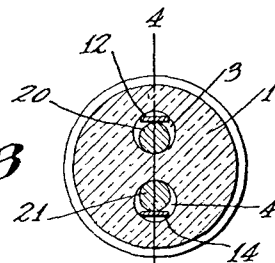


Fig. 4

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UNITED STATES PATENT OFFICE.

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ELECTRICAL HEATING UNIT.

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To all whom it may concern:

Be it known that we, LEONARD E. STEINER and FLOYD P. SMITH, citizens of the United States, both residing at the Bronx, county of Bronx, and State of New York, have invented a certain new and useful Electrical Heating Unit, of which the following is a specification.

This invention is an electrical heating unit adapted to be used in various environments wherein it is desired to convert electrical current into heat through the employment of a resistance coil, and is particularly adapted for use where space is limited and where the maximum amount of heat is desired for minimum displacement by the apparatus or unit utilized for producing such heat.

The object of the invention is to provide a unit which may be made very small and compact although, manifestly, it can be made in larger sizes if desired for heavier duty.

A further object of the invention is to produce a unit of the character described wherein current carrying leads extending exteriorly of the unit are eliminated.

In electrical heating units as now constructed and particularly in connection with the smaller units, it is the universal practice to feed the current to the unit through wire leads extending therefrom, these wire leads being connected to the current source or feed wires by twisting the respective wires together. In practice it is found that after an astonishingly short period these leads break off and render the unit unfit for further use and require it to be discarded or taken apart and repaired.

In accordance with this invention, there are no extraneous contacts exteriorly of the unit, the main feed wires being adapted to be attached directly to the unit in a simple and expeditious manner.

A further feature of the invention is to produce a unit which cannot be tampered with, i. e., one so constructed that curious persons cannot possibly dismantle it without, in effect, disrupting it and rendering it unfit for further use.

A still further important feature of the construction is that the possibility of short circuits is entirely eliminated.

Features of the invention, other than those adverted to, will be apparent from the following detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 shows a unit embodying the present invention partly in central section and partly with the casing and the coil in central section and the remaining parts in elevation.

Figure 2 is a perspective view illustrating one end portion of the core and the co-operating plug.

Figure 3 is a section on the line 3—3 of Figure 4; and,

Figure 4 is a section on the line 4—4 of Figure 3.

Referring to the drawings, 1 designates a core shown, in the main, as cylindrical and which core may be constructed from any suitable refractory material capable of withstanding the heat produced by the resistance coil 2 which is wound about the same. The core is provided with two parallel passes 3 and 4 which extend entirely through the same in parallel relation to the axis of the core.

The core is threaded for the greater portion of its length to provide a helical seat for the windings of the coil 2 in order that successive convolutions of the winding may be properly spaced apart to preclude short circuiting. The opposite end portions of the core are however peculiarly shaped and constitute an important part of this invention.

Each end of the core is slotted or channeled as shown at 5 and 6, these channels or slots being so disposed as to extend inwardly from the ends of the core in parallel relation to one another and so that the passages 3 and 4, which extend through the core, will extend from the base of one slot to the base of the other. This is clearly shown in Figures 2 and 4.

Spaced equal distances from the opposite ends of the core are two annular grooves 7

and 8 and from the base of the groove 7, one end of the core is flattened as shown at 9 in a plane substantially perpendicular to the plane including the axes of the two passages 3 and 4. The same end of the core is also flattened as shown at 10 in a plane parallel to the plane of the flattened surface 9, but the flattened surface 10 extends from the end of the core only a part of the way to the channel 7 being separated therefrom by a flange 11. The opposite end of the core is constructed the same as the end described, but the parts are reversed. That is to say, the flattened part 10^a lies in the same plane as the flattened part 9 while the flattened part 9^a lies in the same plane as the flattened part 10.

This core construction permits of a unique arrangement of the current conveying parts as is apparent from Figure 4. After the core has been constructed in the manner described, I first associate therewith the contact members by means of which electrical connection with the current carrying leads of an outside source are connected to the unit and said current fed to the resistance coil. These contacts are preferably in the form of flat strips designated by the reference characters 12 and 14. These strips may be of a single thickness or they may be laminated. In any event, they are of less width than the diameter of the passages 3 and 4 so that they may extend through these passages in chordal relation to the circular cross sectional shape of the passages as is clearly shown in Figure 3.

In bringing these strips into position, one end of the strip 12 is bent so as to extend from abutting relation with a flange 11 longitudinally of and over the end of the core being thereupon returned upon itself and to extend through the passage 3. At the opposite end of the passage it is bent upwardly and over the end of the core and inwardly along the flattened portion 9 to the base of the channel 7 where it is turned up to leave a free end 15 as shown in Figure 4.

The other strip 14 starts in abutting relation to the flange 11, extends around the adjacent end of the core and after passing through the passage 4 is bent around the opposite end of the core and returned along the flat surface 9^a to be bent outwardly as shown in 15^a. When the parts have been brought into these positions, the resistance coil may be applied.

It may be started anywhere in the channel 7 and during its first convolution is wrapped over the strip 12, which strip is thereupon turned down over the first convolution designated 2^a in Figure 1, so as to grip the winding at this point and form a good electrical contact with the strip 12. The winding of the resistance coil there-

upon proceeds, the successive convolutions being added and conforming to the helical threaded contour of the core until the opposite end of the core is reached. The last convolutions 2^b will occupy the groove or channel 8 and will wrap about the strip 14 adjacent the base of the projection 15^a which is thereupon turned down as shown at the right hand side of Figure 1 to make good electrical connection with this convolution of the coil.

When the parts are thus far assembled, it will be manifest that the strips are locked against longitudinal shifting and while one end of each strip is given a good electrical contact with the corresponding end of the coil, the other end of such strip is electrically insulated from the other end of the coil by the interposed flange 11 which will positively preclude short circuiting. It will moreover be noted that no extraneous attaching means have been employed and no parts have been used which are apt to get out of order or become disarranged or displaced.

The unit having been thus far assembled, the next step of assembly is to apply a plug 16 to each end of the core. Each plug is provided with a rib or key 17 shaped complementary to the slots 5 and 6 and these plugs are provided with holes 3^a and 4^a so positioned that when the plugs are brought into the positions shown in Figure 1, the holes 3^a and 4^a of both plugs will align with the corresponding passages 3 and 4 of the core while the ends of the keys 17 will enter the slots 5 and 6 and bear against the turned over portions of the strips 12 and 14. The plugs are held in the positions stated by a casing or cover 18, cylindrical in form and adapted to encircle or embrace the assembly throughout its entire length. The outer ends of the plugs are chamfered as shown at 19 and the opposite ends of the casing are pressed or spun in over these chamfers so as to force the plugs firmly against the opposite ends of the cores and at the same time bind the parts firmly together within the smooth exterior casing. As the ends of the casing are spun over and force the plugs tightly against the opposite ends of the core, it is found in practice that the strips 12 and 14 are slightly bulged as shown in Figure 1, so as to react with yielding pressure against the passage of a wire or other circular body through either of the passages 3 or 4, so that in connecting the unit to a source of electrical supply, it is only necessary to force positive and negative leads 20 and 21 of ordinary wire into the passages 3 and 4 to assure good electrical contact with the strips 12 and 14 respectively.

It will of course be understood that the

plugs 16 are of nonconductive refractory material, lava being suitable for this purpose. The casing 18 is preferably of metal and is spaced from the resistance coil 2 so as not to short circuit these coils. If desired however some refractory material may be wrapped about the coil before the casing is installed so as to positively preclude short circuiting. Asbestos, mica or other similar substance may be used to advantage in this connection.

It will be apparent from the foregoing detailed description that the complete unit is entirely self contained. It has no exteriorly positioned and extending connections to which current supplying leads have to be attached as heretofore and in addition to being a self contained unit, it is so constructed that after initial manufacture, it cannot be taken apart by curious persons but has to be actually disrupted in order to take it apart. Its cost of manufacture however is so small that repair of such units is not worth while as a new unit is simply substituted for one in case it becomes burned out through the application of too much current to the coils.

The unit may be made very small and is thus particularly useful in connection with small tools requiring heat, not only from its compact standpoint but from its ease of attachment and detachment, with reference to the power leads. The unit moreover may be used in multiple. That is to say, if any particular unit does not give the desired heat, a number of such units may be threaded after the manner of beads upon the positive and negative leads 20 and 21 to include said units in the electrical circuit in multiple. I know of no prior construction which will permit of this highly advantageous arrangement.

The foregoing detailed description sets forth the invention in its preferred practical form, but the invention is to be understood as fully commensurate with the appended claims.

Having thus fully described the invention, what we claim as new and desire to secure by Letters Patent is:

1. An electrical unit embodying a core provided with passages extending longitudinally thereof and into which passages positive and negative feed wires of an electric circuit are adapted to be thrust, a coil encircling the core, a contact strip secured to one end of the coil and extending into one of the passages to form a clamping member adapted to clamp the feed wire which is thrust into said passage, and a second metallic strip secured to the other end of the coil and extending into the other passage to form a clamping member adapted to clamp the other feed wire when said wire

is thrust into said passage, whereby the introduction of the positive and negative feed wires into said passages will cause the coil to be included in the circuit of which said wires form a part.

2. An electrical unit embodying a core provided with passages extending longitudinally thereof and into which passages positive and negative feed wires of an electric circuit are adapted to be thrust, a coil encircling the core, a contact strip secured to one end of the coil and extending into one of the passages to form a clamping member adapted to clamp the feed wire which is thrust into said passage, and a second metallic strip secured to the other end of the coil and extending into the other passage to form a clamping member adapted to clamp the other feed wire when said wire is thrust into said passage, whereby the introduction of the positive and negative feed wires into said passages will cause the coil to be included in the circuit of which said wires form a part, a casing enclosing the core and coil, and means for closing the opposite ends of the casing.

3. An electrical unit embodying a core provided with passages extending longitudinally thereof and into which passages positive and negative feed wires of an electric circuit are adapted to be thrust, a coil encircling the core, a contact strip secured to one end of the coil and extending into one of the passages to form a clamping member adapted to clamp the feed wire which is thrust into said passage, a second metallic strip secured to the other end of the coil and extending into the other passage to form a clamping member adapted to clamp the other feed wire when said wire is thrust into said passage, whereby the introduction of the positive and negative feed wires into said passages will cause the coil to be included in the circuit of which said wires form a part, a tubular sleeve embracing the core and coil and spaced from the latter, end pieces positioned within the opposite ends of the sleeve and beyond the opposite ends of the core and provided with apertures aligned with the passages in the core, the ends of the casing being turned inwardly over the end pieces to hold said end pieces in position.

4. An electrical unit embodying a core having two passages extending longitudinally therethrough and into which passages feed wires are adapted to be thrust, a leaf spring positioned interiorly and extending longitudinally of each passage, a coil encircling the core with one end of the coil electrically connected to one leaf spring and the other end of the coil electrically connected to the other leaf spring, whereby said leaf springs will serve to firmly grip the

feed wires thrust into the passages and simultaneously include the coil in the circuit of which said feed wires form a part.

5. An electrical unit embodying a core having two passages therethrough, a coil wrapped about the core, a metallic strip secured to one end of the coil, extending through one passage and hooked over the opposite end of the core, and a metallic strip secured to the opposite end of the coil extending through the other passage and hooked over the other end of the core, whereby said strips are secured against movement longitudinally of their respective passages and are adapted to be engaged by positive and negative leads of an electrical circuit forced into said passages for the purpose of including the coil in circuit.

6. An electrical unit embody a core having two passages therethrough, a coil wrapped about the core, a metallic strip secured to one end of the coil, extending through one passage and hooked over the opposite end of the core, and a metallic strip secured to the opposite end of the coil extending through the other passage and hooked over the other end of the core, whereby said strips are secured against movement longitudinally of their respective passages and are adapted to be engaged by positive and negative leads of an electrical circuit forced into said passages for the purpose of including the coil in circuit, and a casing encircling and housing the core and coils and free from engagement with the latter.

7. An electrical unit embodying a core provided with passages extending therethrough, a coil encircling said core, a strip, one end of which is secured to one end of the coil and the strip thereupon passed through one of the passages and returned along the exterior of the core to a point adjacent but spaced from the contiguous end of the coil, a second strip secured to the last mentioned end of the coil and passing through the other passage and returned along the outer periphery of the core to a point adjacent to but spaced from the contiguous end of the coil, whereby said strips constitute terminal contacts of the coil adapted to be engaged by positive and negative leads introduced into the passages of the core.

8. An electrical unit embodying a core provided with two passages extending therethrough, a strip extending through each passage, the opposite ends of each strip being hooked over the ends of the core to retain the strips against longitudinal movement, a coil secured to the end of one strip and helically wound about the exterior of the core to adjacent the opposite end thereof where it is secured to the end of the other strip, whereby said strips constitute terminal contacts of the coil and are adapted

to be engaged by positive and negative wires introduced into the passages of the core for the purpose of including the coil in circuit.

9. An electrical unit embodying a core provided with two passages extending therethrough, a strip extending through each passage, the opposite ends of each strip being hooked over the ends of the core to retain the strips against longitudinal movement, a coil secured to the end of one strip and helically wound about the exterior of the core to adjacent the opposite end thereof where it is secured to the end of the other strip, whereby said strips constitute the terminal contacts of the coil and are adapted to be engaged by positive and negative wires introduced into the passages of the core for the purpose of including the coil in circuit, that portion of the exterior of the core which the coil embraces being longitudinally threaded to provide a helical seat for the coil to preclude adjacent convolutions of the coil from contact with one another.

10. An electrical unit embodying a core provided with two passages extending therethrough, a strip extending through each passage, the opposite ends of each strip being hooked over the ends of the core to retain the strips against longitudinal movement, a coil secured to the end of one strip and helically wound about the exterior of the core to adjacent the opposite end thereof where it is secured to the end of the other strip, whereby said strips constitute the terminal contacts of the coil and are adapted to be engaged by positive and negative wires introduced into the passages of the core for the purpose of including the coil in circuit; a tubular casing surrounding the coil and core and extending beyond the ends of the latter, plug members positioned within the opposite ends of the casing and having apertures alined with the passages in the core, the opposite ends of the casing being turned in over the plug members to maintain them in position and to hold the parts in assembled relation.

11. An electrical unit embodying a core provided with two passages extending therethrough, a strip extending through each passage, the opposite ends of each strip being hooked over the ends of the core to retain the strips against longitudinal movement, a coil secured to the end of one strip and helically wound about the exterior of the core to adjacent the opposite end thereof where it is secured to the end of the other strip, whereby said strips constitute the terminal contacts of the coil and are adapted to be engaged by positive and negative wires introduced into the passages of the core for the purpose of including the coil in circuit, a tubular casing surrounding

the coil and core and extending beyond the ends of the latter, plug members positioned within the opposite ends of the casing and having apertures alined with the passages in the core, the opposite ends of the casing being turned in over the plug members to maintain them in position and to hold the parts in assembled relation, each plug member having a key and slot connection with the adjacent end of the core 10 to maintain the apertures of the plug in alinement with the passages of the core.

In testimony whereof we have signed the foregoing specification.

LEONARD E. STEINER.
FLOYD P. SMITH.