T. C. RUSSELL.

ELECTRICAL HEATING DEVICE.

APPLICATION FILED MAR. 23, 1921.

1,419,309. Patented June 13, 1922.

Fig. 1.

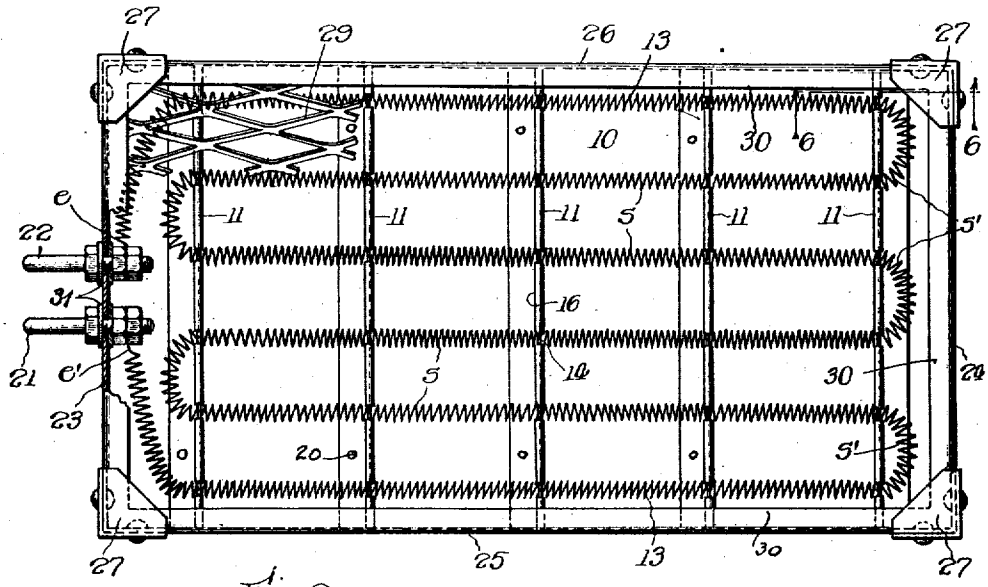


Fig. 2.

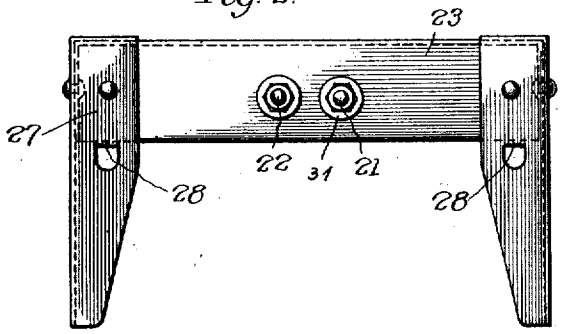


Fig. 6.

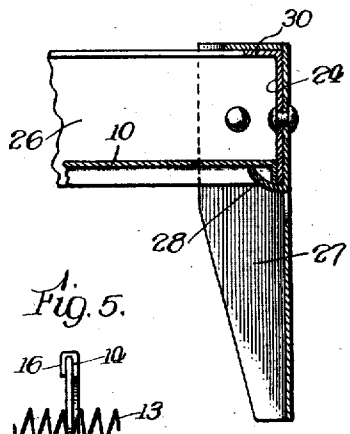


Fig. 3.

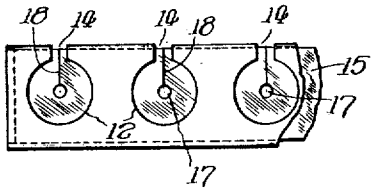


Fig. 5.

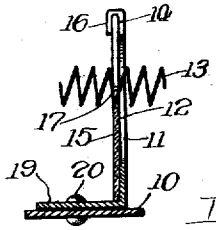
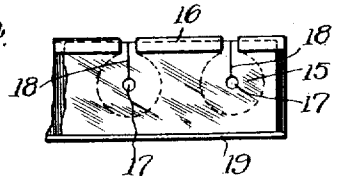


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL HEATING DEVICE.

1,419,309. Specification of Letters Patent. Patented June 13, 1922.

Application filed March 23, 1921. Serial No. 454,781.

To all whom it may concern:

Be it known that I, THOMAS C. RUSSELL, a citizen of the United States, and a resident of Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Electrical Heating Devices, of which the following is a specification.

My invention relates to electrical heating devices, particularly to that class in which bare electrical resistance conductors form the heating element.

The main object of my invention is to provide improved means for readily receiving and supporting the various sections of a continuous resistance conductor and for efficiently insulating such sections from each other. In accordance with my invention, a plurality of skeleton sheet metal frames are supported on a base structure, each frame securing a sheet of mica having vertical slots or slits leading to holes, the sections of the resistance conductor, which is in the form of a helix, being then readily slipped through the slits to be thereafter locked in the holes, this arrangement eliminating expensive special parts such as insulating bushings or thimbles and simplifying the process of applying the conductor sections in place.

My invention also involves other features of construction and arrangement which all co-operate to produce a strong, simple but efficient structure of a few parts which are securely held together in the most simple manner.

The various features of my invention are disclosed in the device illustrated on the accompanying drawings in which

Fig. 1 is a plan view,

Fig. 2 is an end view,

Fig. 3 is a side view of a section of one of the supporting frames,

Fig. 4 is a view of the other side of the frame of Fig. 3,

Fig. 5 is an enlarged vertical cross sectional view of one of these frames and

Fig. 6 is a sectional view on line 6—6, Fig. 1.

The device shown on the drawings is a rectangular stove which can be used for toasting, cooking or other heating purposes. On the rectangular base plate 10 are supported the transversely extending resistance conductor supporting frames 11, the construction and arrangement of these frames being clearly shown in Figs. 3, 4 and 5. Each frame is formed of sheet metal and has the openings 12 therein which are larger than the transverse area of the resistance wire helix 13. Above the openings the metal of the frame is cut away to leave the passageways or slots 14 leading to the openings. On one side of each frame and extending across the openings and slots is a sheet 15 of mica or other suitable insulating and fire proof material, the sheets being held in place by bending down the upper edge section 16 of the frame against the strip as clearly shown in Fig. 5. The mica sheet of each frame has the holes 17 therethrough which are preferably concentric with the openings 12 in the frame, and at each slot 14 the mica sheet has a slit 18, the slits extending downwardly to the respective holes 17. Through these slits the wire of the resistance helix is forced downwardly into the holes 17, the slits closing up after insertion of the wire to then lock the helix in place. The resistance helix supporting frames may be secured in any suitable manner. As shown they are deflected laterally at their lower edges to provide bases 19 by means of which they may be secured to the base plate 10 by means of spot-welding or by means of rivets 20.

On the structure shown the resistance element is a single length of resistance helix of the desired resistance, and is arranged in longitudinally extending rows or sections *s*. At the slots 14 of the supporting frames the wire of the helix is pressed down through the slits 18 to the holes 17, the mica adjacent the slits yielding during passage of the wire but coming together again after the wire reaches the holes 17 to thereafter lock the wire in such holes and prevent rising thereof through the slits. The openings 12 being much larger than the helix, there will be sufficient extent of mica between the helix and the metal frame to prevent contact at any time of the helix with the frame. The helix supporting frames at the ends of the base 10 are secured to present their mica sheets on the outside so that the transverse sections *s'* of the helix between the longitudinal sections *s* thereof will be insulated from the metal of the frames. The ends *e* and *e'* of the resistance helix are secured to the

contact pins 21 and 22 arranged to receive a suitable terminal socket connected with a current conducting wire.

The supporting plate 10 with the heating elements and supporting frames thereon is preferably enclosed in suitable framework. The framework shown is rectangular and comprises the end walls 23 and 24 and the side walls 25 and 26, the frame being of a width and length equal to that of the supporting plate 10 so that such plate may form the bottom of the enclosing structure. The ends and sides of the framework may be conveniently secured together by angle members 27 spot-welded or riveted thereto and such members may be extended downwardly to form legs for elevating the structure over the table or other support to permit ventilation and to guard against fire. As a means for supporting the plate 10 I have shown tongues 28 deflected out of the leg structures inwardly to form supports on which the plate 10 may rest.

I preferably provide a grill 29 over the heating helix, which, as shown, rests on the frames 11 and is held thereon by the horizontal flanges 30 on the walls of the enclosing framework. The grill is inserted ahead of the plate 10 whereafter the tongues 28 are deflected against the plate 10 to lock all the parts securely in position.

The contact pins 21 and 22 extend through one of the end walls 23 and 24 from which they are thoroughly insulated by insulating material 31, as plainly shown in Fig. 1.

The holes 17 in the mica sheet could be of larger or smaller diameter than the helix. Preferably they are smaller so that after insertion of the helix the sections *s* will be more securely anchored and their turns kept separated to prevent short circuiting. In prior structures where the helix must be threaded through insulating bushings or holes such secure anchorage of the helix is impossible and the sections are too free and are apt to vibrate and close up at points when under heat. Threading of a long piece of helix back and forth through supports is a very tedious process. With my arrangement however the helix sections are merely pressed down through the mica sheet slits to be thereafter securely anchored and well insulated. The mica is sufficiently yielding to permit the helix to be readily removed, and a heating device can thus be readily provided with a new heating element with speed and accuracy.

Having described my invention, I claim as follows:

1. In an electrical heating device, the combination of a supporting plate, a metallic frame set on edge on said plate and having a plurality of openings therethrough communicating with the upper edge of the frame, a strip of mica secured on said frame and having holes in register with the frame openings but smaller than the frame openings, said strip having slits leading from one edge thereof through said openings and to said holes through which a resistance wire may be inserted to said holes.

2. In an electrical heating device, the combination of a supporting base, a metallic frame secured on edge on said base and having a plurality of openings therethrough and passageways connecting said openings to the upper edge of the frame, a strip of mica secured against said frame and having holes registering with said openings but smaller than said openings, said strip having slits leading from the upper edge thereof through said passageways and openings to said holes, a resistance wire supported in said holes, said slits affording a means for forcing said wire through the mica to said holes.

3. A supporting structure for electrical heating wires comprising a frame having openings therethrough and slots leading from said holes to an edge of the frame, a strip of electrical insulating material supported on said frame and having holes in register with the frame openings, said strip having slits registering with the frame slots and extending from an edge of the strip to the holes therethrough, the material of said strip being yielding to resist but to permit passage of the wires through said slots and into position in said holes.

In witness whereof, I hereunto subscribe my name this 18 day of March, A. D. 1921.

THOMAS C. RUSSELL.