Dec. 11, 1928. 1,694,600

H. S. LEE

ELECTRIC RESISTANCE HEATING ELEMENT

Filed Feb. 12, 1927

Fig. 1.

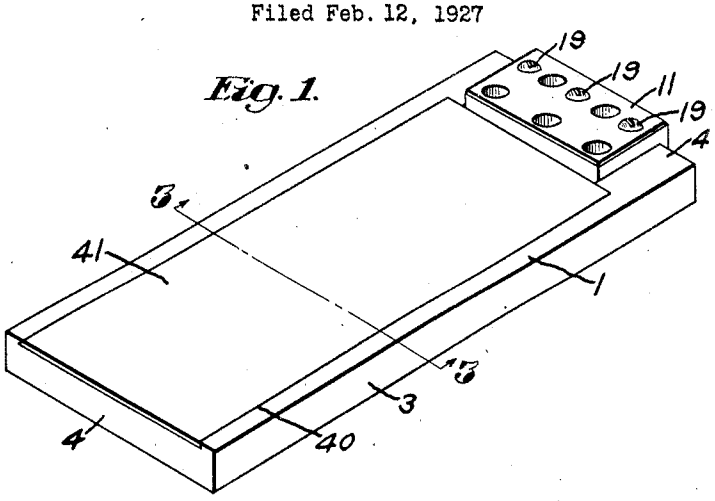


Fig. 2.

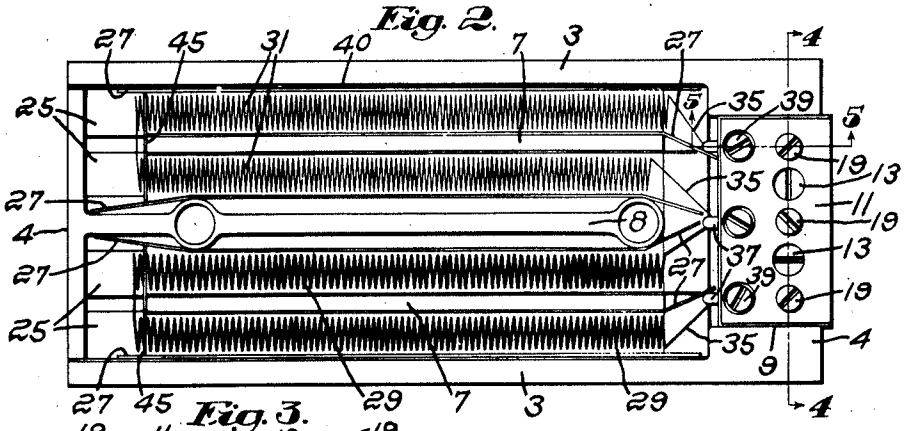


Fig. 3.

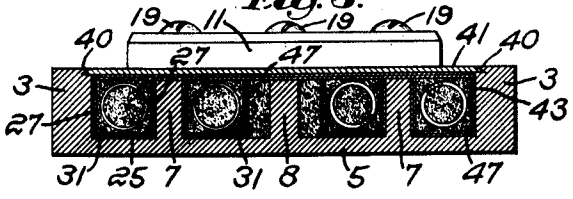


Fig. 4.

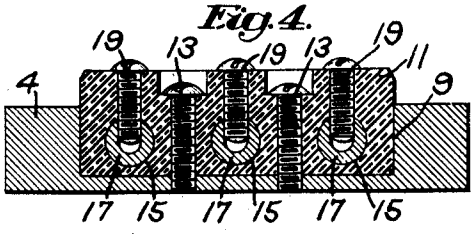
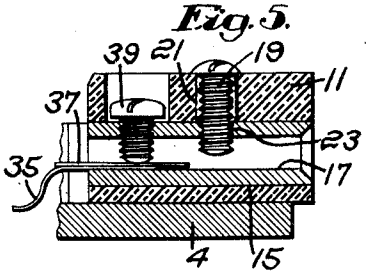


Fig. 5.



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Patented Dec. 11, 1928. 1,694,600

UNITED STATES PATENT OFFICE.

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ELECTRIC RESISTANCE HEATING ELEMENT.

Application filed February 12, 1927. Serial No. 167,687.

My invention relates to electric resistance heating elements, and particularly but not exclusively to those having the form of a flat plate.

The invention will be best understood from the following description when read in the light of the accompanying drawing of an example of the invention, while the scope of the invention will be more particularly pointed out in the appended claims.

In the drawing:—

Fig. 1 is a perspective view of a heating element constructed according to the invention;

Fig. 2 is a plan view corresponding to Fig. 1 with the cover plate removed and the cement filler omitted;

Fig. 3 is a section in a vertical plane which includes the line 3—3 of Fig. 1; and

Figs. 4 and 5 respectively are sections on the lines 4—4 and 5—5 of Fig. 2.

Referring to the drawing I have shown a body 1 of heat conducting material, as for example an aluminum casting, in the form of a flat receptacle having the side walls 3, end walls 4, and bottom 5, the interior of the receptacle as shown being provided with partitions 7 and 8 integral with the bottom. Herein the two partitions 7 terminate short of the left hand end wall 4 as viewed in Fig. 2.

As shown the right hand end wall 4 of the body as viewed in Fig. 2 is formed with the groove 9 communicating with the interior of the receptacle, and in said groove is placed a block 11 of insulating material, as for example lava, secured to the body by means of screws 13. As illustrated by Figs. 4 and 5 the leva block is provided with horizontal bores 15, each of which contains a tube 17 of conducting material, as for example brass, the tubes being removably secured in the bores 15 by means of screws 19 extending through perforations 21 in the block and tapped perforations 23 in the tubes, these screws also serving as binding posts for securing the ends of conductors when inserted in the ends of the tubes.

As shown the spaces between the sides 3 and partitions 7 and those between the partition 8 and partitions 7 are lined with horizontal and vertical insulating strips 25 and 27, these strips conveniently being of sheet mica. On the insulated grooves thus formed are placed coils of resistance wire 29 and 31, the coils 31 for example being of greater resistance than the coils 29. As shown the end portions 35 of the wires forming coils enter the tubes 17 and are secured thereto and placed in electrical communication therewith by means of clips 37 pressed upon by screws 39 entering tapped holes in the tubes so that the clips serve to clamp the end portions of the wires to the tubes.

As illustrated, the partitions 7 and 8 are lower than the sides 3 of the body, the upper edges of said sides being grooved as at 40 for slidably receiving a plate 41. Over the grooves and beneath the plate 41 is placed a plate of mica 43 which by its resiliency and snug fit with the plate and top of the partitions serves to retain the plate against movement in the grooves.

As illustrated, the pairs of coils 31 and 29 respectively are formed of a continuous length of wire, the coils being held in stretched relation to prevent short circuiting of the adjacent turns by means of strips 45, which may be of mica and as shown are inserted between turns of the coils adjacent the ends thereof and bear against the ends of the partitions 7, the resiliency of the coils holding the parts in the position illustrated by Fig. 2 during the manufacture of the device.

Preferably after the parts are assembled as illustrated by Fig. 2 the grooves containing the coils are filled with an insulating cement which is poured in a liquid state and allowed to harden to form solid fillers 47 in the several grooves, in which fillers the coils are embedded with adjacent turns in spaced relation, the fillers thus preventing short circuiting of adjacent turns of the coils which might occur in absence of the fillers if the coils become deformed due to heating. The cement when liquid acts to "float" the coils off the mica strips and thus affords additional insulation between the coils and the body 1. The non-conductive cement preferably is one which after poured in a liquid state will "air-set" at room temperature, and may for example consists of aluminum oxide mixed with refractory fire clay and any suitable non-conductive "air-setting" flux.

Although I have described for purposes of illustration one example of my invention it will be understood that within the scope of

my invention wide deviations may be made without departing from the spirit of my invention.

I claim—

1. An electric resistance heating unit having, in combination, casing means providing parallel, elongated chambers separated by a wall of electrically conductive material, the latter formed to provide a transverse passage establishing communication between said chambers at one of the corresponding end portions thereof, coils of resistance wire extending lengthwise of said chambers, a coil engaging member of heat refractory insulating material for holding said coils under tension, said member extending through said passage and resting against the walls thereof, and a filler of heat refractory insulating material in said chambers insulating the turns of said coils from each other and spacing the coils from the walls thereof.

2. An electric resistance heating unit having, in combination, casing means providing parallel, elongated chambers separated by a wall of electrically conductive material, the latter formed to provide a transverse passage establishing communication between said chambers at one of the corresponding end portions thereof, coils of resistance wire extending lengthwise of said chambers, said coils formed of an electrically continuous length of wire having a portion extending through said passage, a coil engaging member of heat refractory insulating material for holding said coils under tension, said member extending through said passage and resting against the walls thereof, and a filler of heat refractory insulating material in said chambers insulating the turns of said coils from each other and spacing the coils from the walls thereof.

3. An electric resistance heating unit having, in combination, a support, parallel coils formed of a continuous length of resistance wire carried by said support, an insulating partition between said coils, means securing said coils at one end to said support, a part inserted between turns of said coils at the other ends of said coils, said part bearing against the end of said partition and holding said coils under tension.

4. An electric resistance heating unit having, in combination, a support, parallel coils formed of a continuous length of resistance wire carried by said support, an insulating partition between said coils, means securing said coils at one end to said support, a part inserted between turns of said coils at the other ends of said coils, said part being held by said partition and holding said coils under tension.

5. An electric heating resistance unit having, in combination, a support, parallel coils of resistance wire, secured at one of their corresponding ends to said support, a part inserted between the turns of said coils at the opposite corresponding ends thereof, said part resting against means forming an abutment fixed relative to said support and held against said abutment by the tension of said coils.

6. An electric heating resistance unit having, in combination, a flat rectangular casing of conductive material, a terminal block of insulating material at one end of said casing, three terminals carried by said block, parallel coils of resistance wire in said casing extending lengthwise thereof, means independent of said coils and engaging with them for holding them under tension, the corresponding ends of two coils being connected to one of said terminals and the corresponding opposite ends being respectively connected to the other terminals, a cover for said casing, and a cement filler for said casing for immovably securing said coils relative to said casing and for insulating said coils from said casing.

In testimony whereof, I have signed my name to this specification.

HOWARD S. LEE.