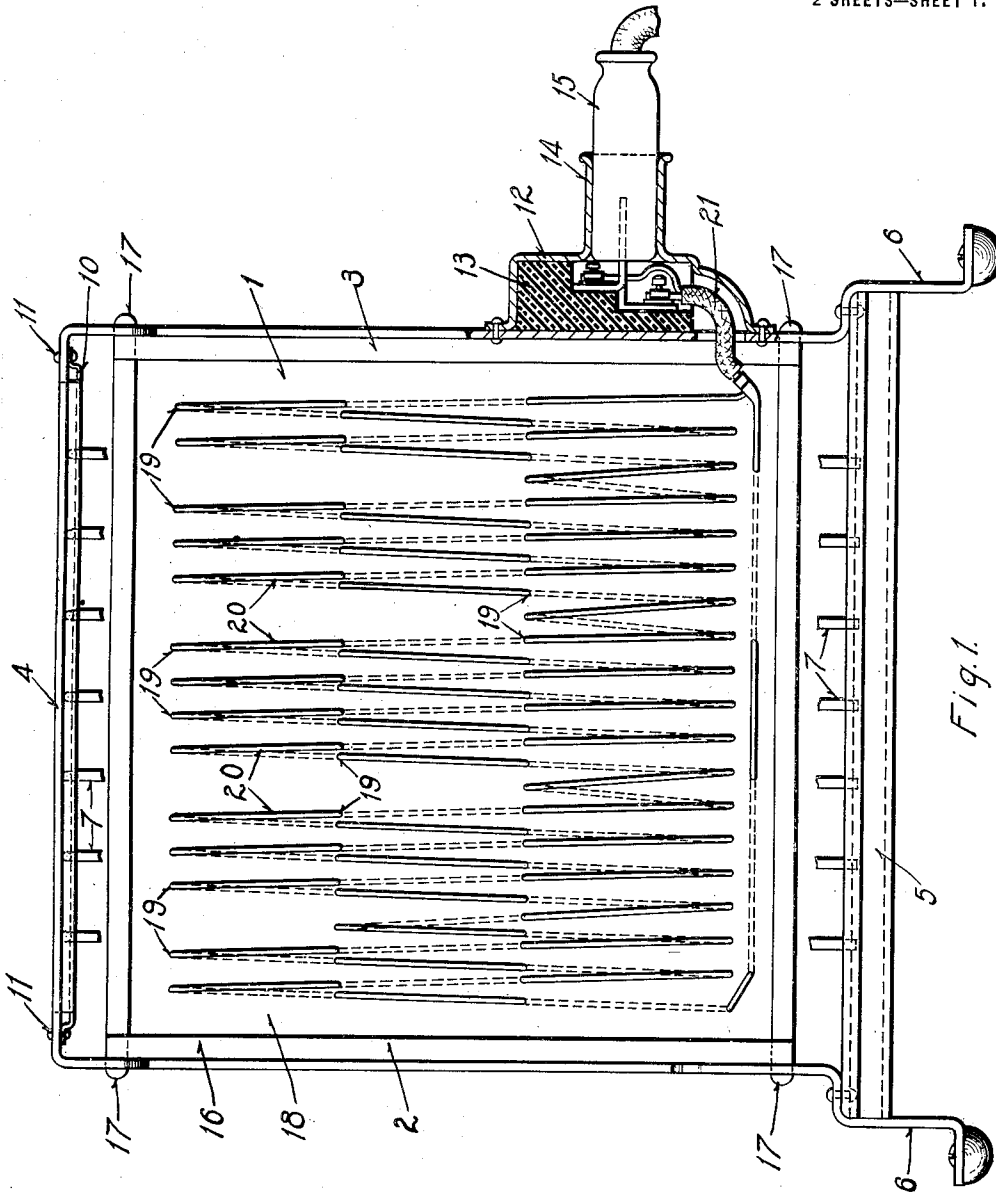


F. THORNTON, JR.  
ELECTRIC HEATING APPARATUS.  
APPLICATION FILED APR. 12, 1915.

1,241,578.

Patented Oct. 2, 1917.

2 SHEETS—SHEET 1.



WITNESSES.

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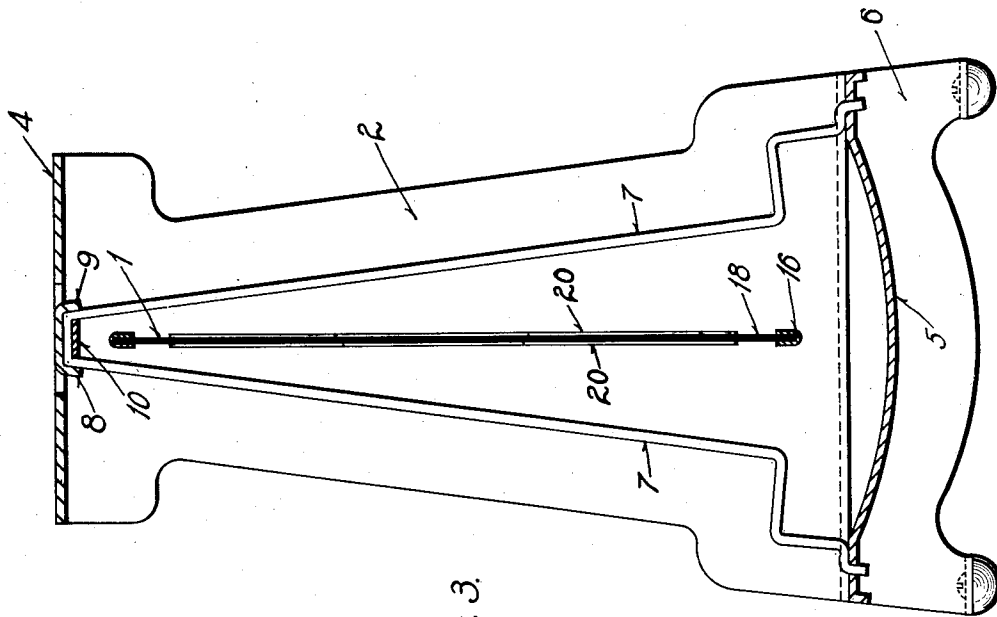


Fig. 3.

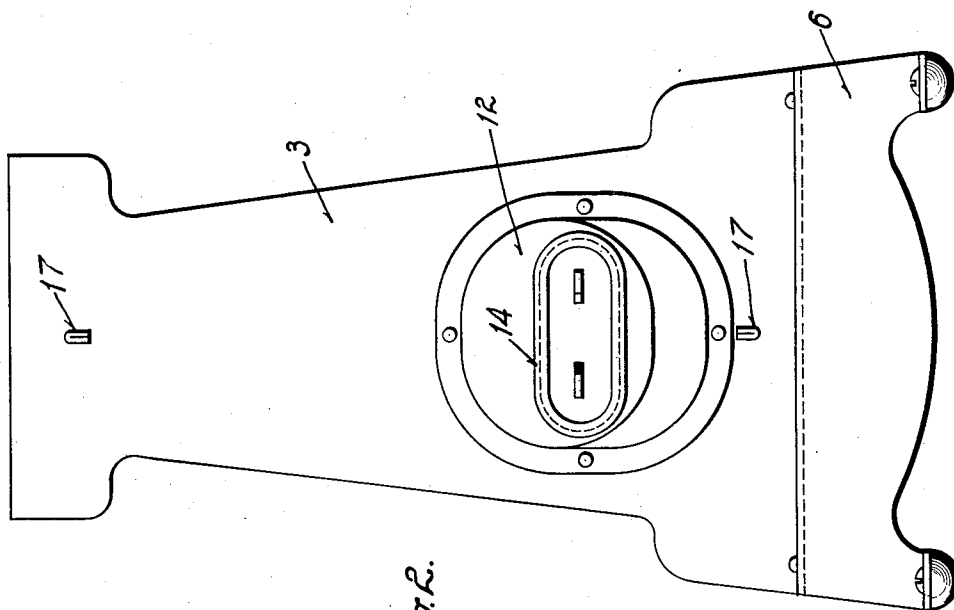


Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## ELECTRIC HEATING APPARATUS.

1,241,578.

Specification of Letters Patent.

Patented Oct. 2, 1917.

Application filed April 12, 1915. Serial No. 20,695.

*To all whom it may concern:*

Be it known that I, FRANK THORNTON, Jr., a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric Heating Apparatus, of which the following is a specification.

My invention relates to electric heating apparatus and it has special reference to heating devices of the radiant type in which a heating element is mounted upon a support of insulating material in contact with the air to impart its heat by radiation.

The object of my invention is to provide a simple and inexpensive method of mounting conducting wires or ribbons upon insulating supports.

More specifically, the object of my invention is to provide a method of mounting resistance elements upon insulating sheets formed of fragmentary insulating material, such as flakes of mica, and a further object of my invention is to provide a radiant-type electric toaster stove having a heating element constructed in accordance with the method indicated above.

In the accompanying drawings, Figure 1 is a side elevational view of a toaster stove constructed in accordance with my invention. Fig. 2 is an end elevational view of the device shown in Fig. 1 taken from the right of Fig. 1, and Fig. 3 is a transverse central sectional view of the same device.

The device shown on the drawing consists of a rectangular heating plate 1 mounted in a substantially vertical position in a frame composed of end pieces 2 and 3 joined by a top plate 4 and a bottom plate 5, the end pieces 2 and 3 being bent outwardly and downwardly to form supporting legs 6. The bottom plate is curved downwardly, as shown in Fig. 3, to form a crumb collector. Wires 7 are disposed on both sides of the heating element 1 and are bent into the form shown for the purpose of supporting slices of bread or the like to be toasted. The ends of the wires 7 may be received in perforations in the bottom plate 5, and the bent central portions of the wires are supported in clamps formed by cutting slots in the top plate 4 and bending the cut por-

tion of the metal into ears 8 and 9. A metal strip 10 coöperates with the clamping ears 8 and 9 to hold the wires 7 in place and is fastened to the top plate 4 by means of rivets 11. A terminal block holder 12 is riveted to the end plate 3 and contains a terminal block 13 of any suitable form. The holder 12 is formed into a receptacle 14 adapted to receive a terminal block 15.

The structural details thus far described are merely illustrative and are not essential to my invention, which is concerned particularly with the structure of the heating element 1. This element is composed of a rectangular metal frame 16 provided with ears 17 at its four corners which are adapted to project through openings in the end pieces 2 and 3 of the toaster frame. A rectangular plate 18, composed of built-up mica flakes, is mounted in the frame 16 and is provided with spaced rows of perforations 19 through which is passed a resistance wire or ribbon 20, the ends of which are led to the terminal block 13 through a cord 21.

It will be observed that three transverse rows of resistance strips are provided on each side of the plate 18 and that the lowest row of the three consists of a greater number of strips than the two upper rows. This is a desirable arrangement because it affords increased heat-radiating capacity adjacent to the lower portions of the slices of bread that may be supported on the rack formed by the wires 7, which portions of the bread are farther away from the heating element than the upper portions.

In making the heating element, a composite plate is first formed from small flakes of mica held together by a bonding material that can subsequently be driven off by heating. This composite plate is mounted in the frame 16 and perforated in the manner shown, and the resistance wire or ribbon is wound on the sheet of mica by lacing it through the corresponding perforations in the several rows. The plate is then heated to a sufficient temperature to evaporate the bonding material, leaving the heater consisting only of the mica and the resistance material. The method of winding the resistor by lacing it through the holes results in hold-

ing the small pieces of mica in their proper positions after the bonding material has been driven off. In all similar structures that have heretofore been devised, it has  
 5 been necessary to provide solid sheets of natural mica of the necessary area, and such sheets are relatively expensive. It will be evident that my method of mounting resis-  
 10 tors, in which the resistor is supported by the composite insulating material and also serves to hold the insulating material in its assembled position, results in a considerable saving in expense.

The principles of my invention may be ap-  
 15 plied to many forms of devices other than radiant toaster stoves, and it is also to be understood that fragmentary insulating material other than mica may be used within the scope of my invention. I desire, therefore,  
 20 that no limitations be imposed upon my invention unless indicated in the appended claims.

I claim as my invention:

1. The method of mounting electric con-  
 25 ductors upon insulating supports that comprises uniting a fragmentary insulating material into a coherent structure by means of a binder, mounting a body of conducting material on the said structure, and removing  
 30 the said binder.

2. The method of mounting electric con-  
 ductors upon insulating supports that comprises uniting flakes of mica into a coherent structure by means of a binder, mounting a  
 35 body of conducting material on the said structure and removing the said binder.

3. The method of mounting electric con-  
 ductors upon insulating supports that comprises uniting flakes of mica into a coherent  
 40 structure by means of a binder, mounting a body of conducting material upon the said structure in such a manner as to hold the flakes together, and removing the said binder.

4. The method of mounting electric con-  
 ductors upon insulating supports that comprises forming a composite sheet of a frag-  
 45 mentary insulating material and a binder, perforating the said sheet, passing a body  
 50 of conducting material through the perforations in the said sheet, and removing the said binder.

5. The method of mounting electric con-  
 ductors upon insulating supports that com-  
 55 prises forming a composite sheet of mica flakes and a binder, perforating the said sheet, passing a body of conducting material through the perforations in the said sheet, and removing the said binder.

6. The method of mounting electric con-  
 ductors upon insulating supports that com-  
 60 prises forming a composite sheet of mica flakes and a binder that can be subsequently removed by heat, perforating the said sheet,  
 65 passing a body of conducting material

through the perforations in the said sheet, and heating the resulting structure to remove the said binder.

7. The process of making resistance de-  
 vices for electric heating apparatus and the like that comprises forming a composite  
 70 sheet of a fragmentary insulating material and a binder, forming a plurality of spaced perforations in the said sheet, passing a re-  
 75 sistance wire through the said perforations in such a manner that the resistance wire is supported by the said sheet and also serves to maintain the fragmentary material in its assembled position, and removing the said binder.

8. The process of making resistance de-  
 vices for electric heaters and the like that comprises forming a composite sheet of mica flakes and a vaporizable binder, form-  
 80 ing a plurality of spaced perforations in the said sheet, passing a resistance wire through the said perforations in such a manner that the resistance wire is supported by the said sheet and also serves to maintain the mica flakes in their assembled position, and apply-  
 85 ing heat to volatilize the said binder.

9. The process of making resistance de-  
 vices for electric heaters and the like that comprises forming a composite sheet of mica flakes and a binder, forming a plurality  
 90 of rows of perforations in the said sheet, passing a resistance wire back and forth through the corresponding perforations in the said rows in such a manner that the resistance wire is supported by the said sheet and also serves to hold the said mica flakes together, and removing the said binder.

10. An electric heating device comprising a composite structure of fragmentary insulating material held in assembled position  
 105 by means of a resistance element, the said resistance element being supported upon the said structure and extending therethrough in a plurality of convolutions.

11. An electric heating device comprising  
 110 a sheet composed of mica flakes held together by means of a resistance element supported upon the said structure and extending therethrough in a plurality of convolutions.

12. An electric heating device comprising  
 115 a composite sheet of mica flakes provided with a plurality of rows of perforations, and a resistance wire extending back and forth through the corresponding perforations in the said rows in such manner that the said resistance wire is supported by the said sheet and also holds the said flakes together.

13. A radiant electric toaster device comprising a frame, a radiant resistance device  
 125 supported therein and a terminal device for supplying energy to the said resistance device, the said resistance device comprising a composite sheet of mica flakes provided with a plurality of rows of perforations and a re- 130

sistance wire extending back and forth through the corresponding perforations in the said rows in such manner that the said resistance wire is supported by the said sheet and also holds the said flakes together.

5 14. An electric heating device comprising a frame, a sheet of insulating material supported vertically by the said frame, and a

resistance conductor extending through perforations in the sheet and supported thereby 10 to present radiating surfaces on both sides of the said sheet.

In testimony whereof, I have hereunto subscribed my name this 30th day of March, 1915.

FRANK THORNTON, JR.