(No Model.)

J. V. CÂPEK.

ELECTRICAL HEATER.

No. 449,036. Patented Mar. 24, 1891.

Fig. 1.

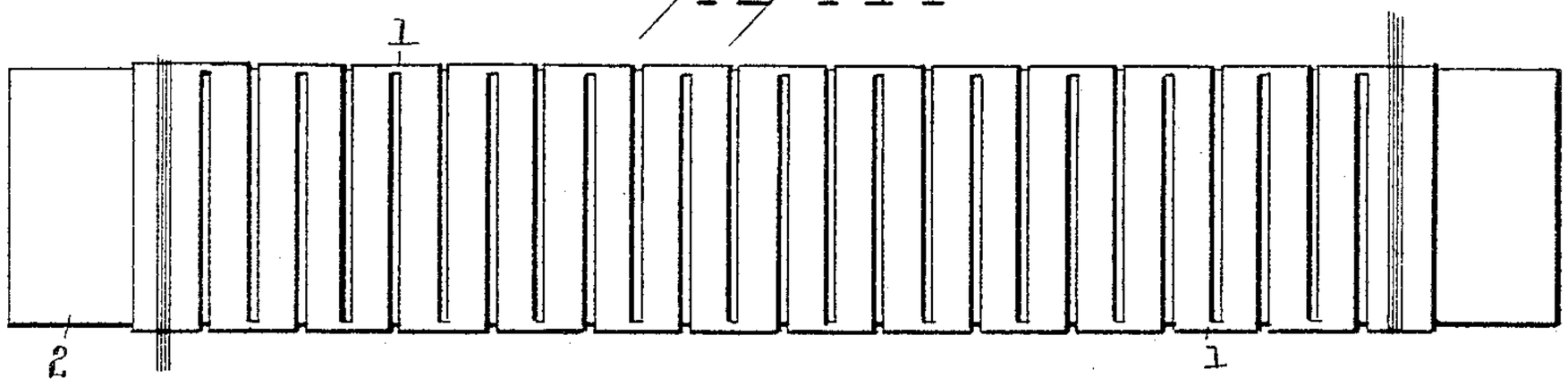


Fig. 2.

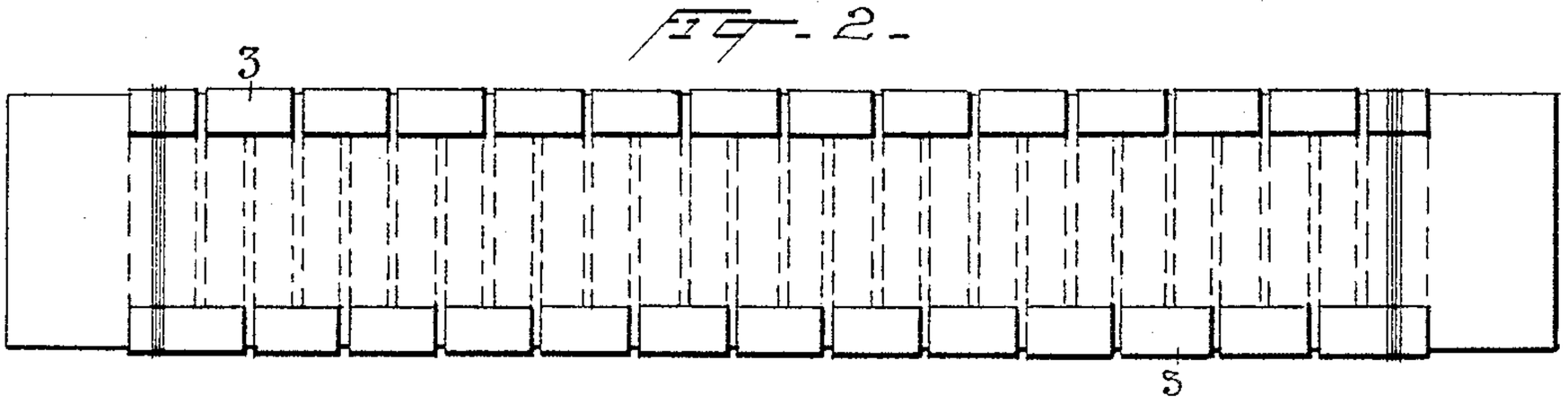


Fig. 3.

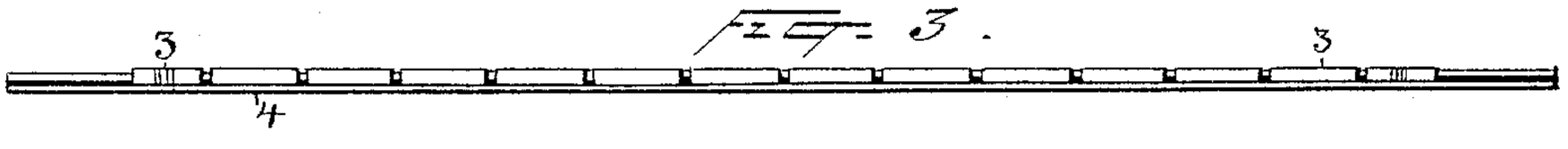


Fig. 4.

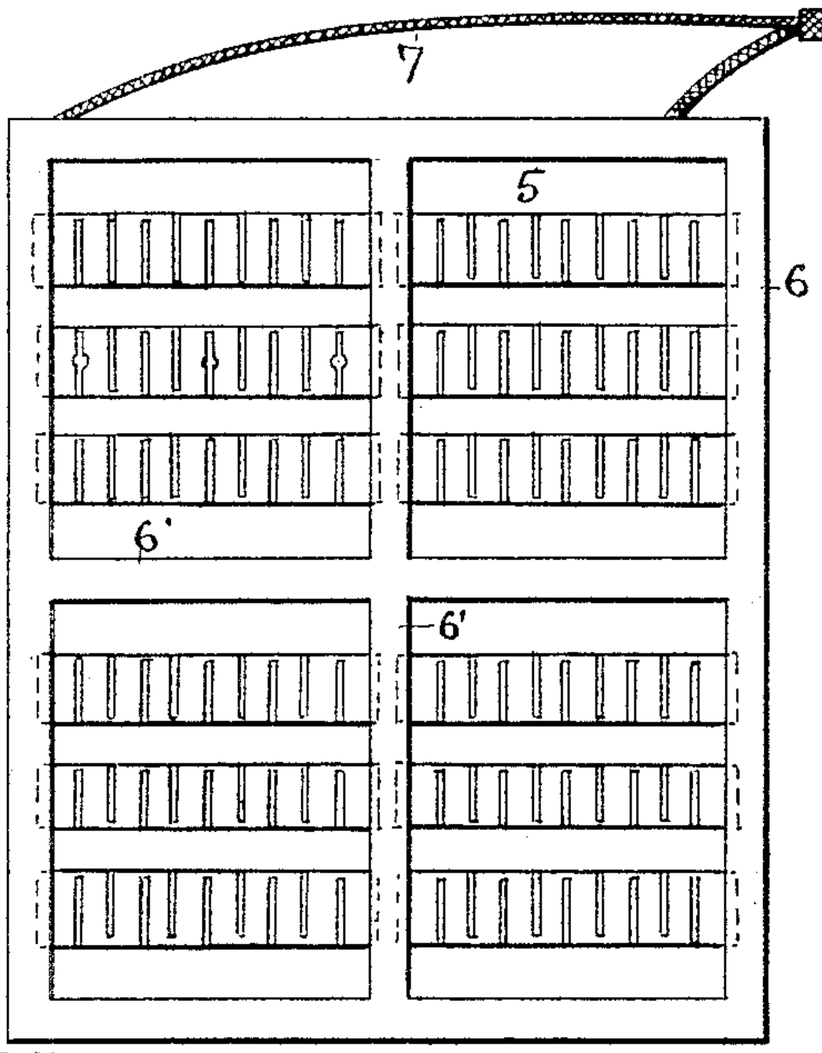
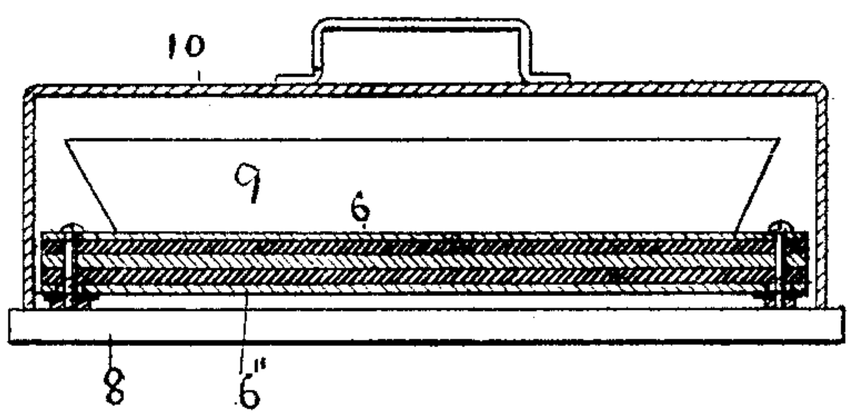


Fig. 5.



Witnesses
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By his Attorneys,
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UNITED STATES PATENT OFFICE.

JOHN V. CAPEK, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO EDWARD H. JOHNSON, OF SAME PLACE.

ELECTRICAL HEATER.

SPECIFICATION forming part of Letters Patent No. 449,036, dated March 24, 1891.

Application filed July 21, 1890. Serial No. 359,397. (No model.)

To all whom it may concern:

Be it known that I, JOHN V. CAPEK, a citizen of the United States, residing at New York city, in the county and State of New York, have invented a certain new and useful Improvement in Electrical Heaters, of which the following is a specification.

In the accompanying drawings, which illustrate my invention, Figure 1 is a plan view of a heating-strip. Fig. 2 is an inverted plan of a part of said strip. Fig. 3 is a side view thereof. Fig. 4 is a plan view of several strips grouped on a suitable base, and Fig. 5 is a sectional view of a heater supported on a platform and covered by a lid.

It is sometimes desirable in cooking (as when the material to be cooked covers a comparatively large surface—for example, the bottom of the pan) to have the heat also diffused over a correspondingly large surface under the pan. Moreover, the heating-conductor should be so arranged that the largest possible percentage of the heat generated should be effective. This is not the case with a heating-wire which is round in cross-section, since the heat rays diverge in all directions, and only those which extend vertically upward fall directly on the vessel to be heated. Hence with such a wire the effective radiating capacity is in evident misproportion with the conducting capacity of the heating-conductor, and to obtain a given temperature it is necessary to use a large conductor to avoid overheating and consequent fusion. The present invention is believed to fulfill the requirements in this class of heaters.

I take a strip of foil of German silver (say .002 inches thick) or other suitable high-resistance conductor, preferably about two inches wide, and cut slits of about one-sixteenth inch alternately from opposite edges, thereby forming a zigzag strip, as indicated at 1, although it is not essential that the conductor be formed of one integral sheet, as above set forth. The resistance of this conductor may be varied indefinitely by varying the width of the slits cut in the sheet. The conductor is placed on one surface of a strip 2 of asbestus, porcelain, mica, or other suitable heat-resisting insulating material, and may be attached in any desirable manner. It is preferable, however, to make strip 2 narrower than the strip from which the zigzag conductor is formed, and then to bend the edges of the metal strip over the edges of strip 2, as clearly shown at 3, Figs. 2 and 3 of the drawings. A conductor thus arranged possesses the greatest possible radiating-surface and renders it unnecessary to increase its size in order to obtain sufficient conductivity for the production of a definite temperature, as indicated above in connection with round-wire conductors.

To further guard against the effect of high temperature on the conductor, the foil is covered by an electroplating of another metal. This may be a metal which readily oxidizes, such as iron or copper, or it may be a metal not readily oxidzable, such as nickel or platinum. A thin coating of either of these metals will not decrease the electrical resistance in as great a ratio as it increases the fusing-point of the conductor as a whole. It will therefore protect and strengthen the foil.

When strip 1 has been placed on an insulating-strip, a circuit-wire is connected to either end. The wire may be wound around the compound strip, as shown in Figs. 1 and 3, or may be connected in any other suitable manner. A second strip of asbestus or other material 4 is placed against the under surface of strip 2 and the turned edges 3 of the conductor, and strips 2 4 are fastened together by any suitable means.

Several of the prepared strips may be placed in separate groups on a common base 5, preferably of hardened asbestus or a multiple sheet of asbestus, the top and bottom layers being hardened. Over the strips thus arranged may be placed a metal frame or grate 6 (say from one-eighth to one-fourth inch in thickness) with or without the cross-bars 6′. This grate may or may not form the only means for securing the strips on the base. The metal grate being in intimate relation with the heater serves to diffuse the heat, and since the metal bottom of the cooking-vessel is placed directly thereon it may be considered as a metallic extension of said vessel, serving to form an uneven bottom of large surface and to bring the same nearer to the heater and at the same time preventing injury of the

heating-strips. The heating-plate or cooking-vessel may be screwed to the grate; but this is not essential.

To strengthen and give stability to the structure, a slender metal frame 6″ is attached to the under side of insulating-base by means of bolts. The perforations in frame 6″ should be so large that there will be no metal contact between said frame and the bolts. This is necessary to prevent conduction of heat away from the upper surface of the heater.

The circuit is ordinarily connected in series through all the strips; but this form of connection is not essential. The circuit-wires 7 may pass through the base and be united into a cord, the wires being insulated from each other and terminating in a suitable connecting device.

With a flat conductor mounted on an insulating-strip there is practically no danger of short-circuiting between the several parallel turns of the conductor, since the whole conductor rests on the supporting-strip and will not be readily displaced, and expansion due to changes in temperature of the conductor could not sufficiently distort the same to bring the turns together. The operation of the above-described apparatus has been sufficiently indicated by the description of the apparatus itself and need not be repeated.

In Fig. 5 the heater is shown placed on a table or other platform 8. A pan 9 rests on the heater, and a cover 10 is over the pan and heater. No oven of special construction is necessary.

Without confining myself to all the details of construction above set forth, what I claim is—

1. In an electrical heater, the combination of a strip of heat-resisting insulating material and a flat zigzag heating-conductor on one face of said strip, substantially as described.

2. In an electrical heater, the combination of a strip of heat-resisting insulating material and a flat zigzag heating-conductor on one face of said strip and bent over the edges thereof, whereby it is held in place, substantially as set forth.

3. In an electrical heater, the combination of a strip of heat-resisting insulating material and a flat zigzag heating-conductor on one face of said strip and a re-enforcing strip of heat-resisting material upon the second face of the first-mentioned strip, substantially as described.

4. In an electrical heater, the combination, with a base, of several heating-conductors in separate groups thereon and a thin metal grate placed over the same, substantially as set forth.

5. In an electrical heater, the combination, with a base, of several heating-conductors in separate groups thereon and a thin metal grate holding the same in place, substantially as described.

6. In an electrical heater, the combination, with a base, of heating-conductors thereon, a metal grate placed over the same, and the extended and insulated circuit-wires, substantially as described.

7. In an electrical heater, the combination, with a base, of heating-conductors thereon, a metal grate placed over the same, and a metal frame under the same, the several parts being connected together and the lower frame being insulated from the grate, substantially as described.

8. An electrical heater-conductor of German silver or other suitable metal covered with an electroplating of different metal, substantially as described.

9. A conductor for electrical heaters, consisting of a thin sheet of foil slitted alternately from opposite edges, whereby a zigzag conductor is produced, substantially as described.

10. A conductor for electrical heaters, consisting of a thin sheet of foil slitted alternately from opposite edges and covered with a layer of a different metal, substantially as described.

This specification signed and witnessed this 17th day of July, 1890.

JOHN V. CAPEK.

Witnesses:
CHARLES M. CATLIN,
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