(No Model.)

J. V. CÂPEK.

ELECTRICAL HEATER.

No. 449,035. Patented Mar. 24, 1891.

Fig. 1.

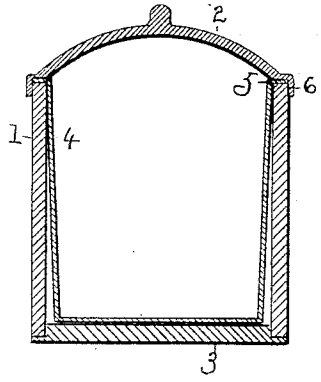


Fig. 3.

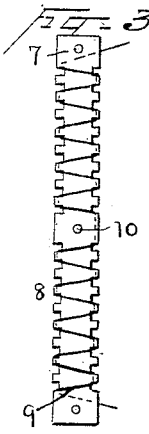


Fig. 5.

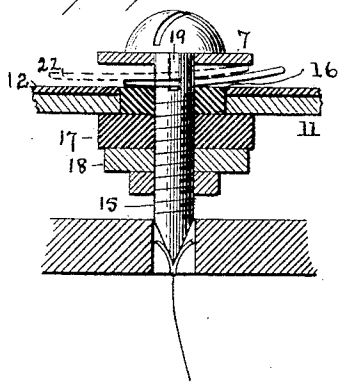


Fig. 2.

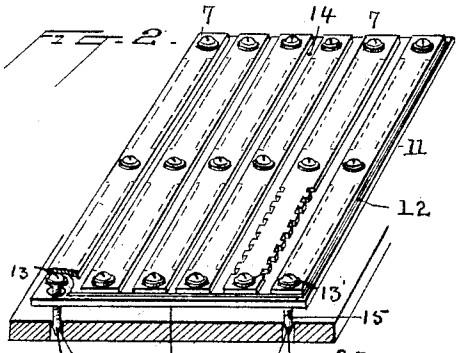
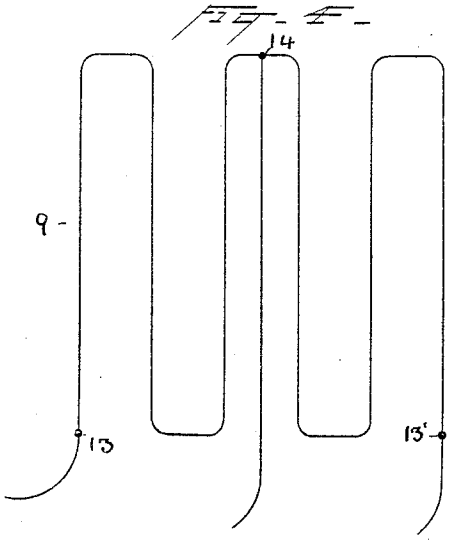
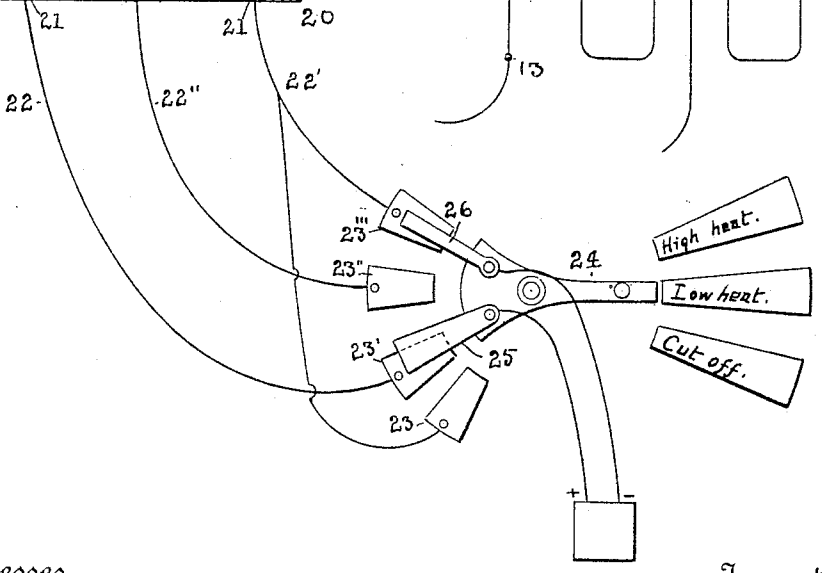


Fig. 4.





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UNITED STATES PATENT OFFICE.

JOHN V. CÂPEK, 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. 449,035, dated March 24, 1891.

Application filed July 21, 1890. Serial No. 359,396. (No model.)

To all whom it may concern:

Be it known that I, JOHN V. CÂPEK, a citizen of the United States, residing at New York city, in the county and State of New York, have invented certain new and useful Improvements in Electrical Heaters, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a cross section through an oven, cooking-vessel, and heater. Fig. 2 is a general view of the heater detached from the oven and a switch for controlling the circuits. Fig. 3 is a view of the support for the heating-wire and of said wire. Fig. 4 is a diagram of the circuits of the heater, and Fig. 5 is a detail view of a connector employed in the system.

The oven is composed of a tubular portion 1, which may be round, square, or other shape in cross-section, a removable cover 2, and the removable bottom 3, said removable bottom consisting of the heater and its supporting platform. The wall of the oven, as well as the cover, is made of a poor conductor of heat, or of two parallel walls with the intermediate space filled with a non-conducting material, as is well understood. Within the oven fits a cooking-vessel 4. This is preferably of metal. At its upper end is a flange 5, resting on the oven-wall and supporting the vessel, with its bottom immediately over the upper surface of the heater. The vessel is smaller than the oven, so that a space is left around the same. The joint formed by the flange 5 and by the flange 6 on the cover prevents the escape of heat at this point. The bottom of the vessel on the outside I coat with copper, which, by use of the heater, is converted into copper oxide. In cooking certain articles the vessel 4 may be dispensed with, and a metal plate may be placed over the heater, occupying the same position as the bottom of the said vessel. Such plate would be coated with copper oxide in the manner already described.

The heater is constructed as follows: Several strips 7, made, preferably, of asbestus hardened by immersion in some non-hygroscopic and heat-resisting material, preferably sulphate of copper, and drying the same under pressure, are provided with projecting teeth or pins 8 on two opposite edges. These may be formed by making saw-kerfs in the edge of the strip. The heating-wire 9, which is preferably of German silver for small heaters or iron wires for large heaters, is then wound in a sinuous course back and forth over the upper surface of the strip, the wire passing under every alternate pin or tooth on each side of the strip, as clearly indicated in Fig. 3. If the strips are long, it is desirable to leave spaces at intervals, as indicated at 10, to accommodate fastening devices—such as screws—for connecting the strips to the base. The heating-wire is also preferably coated with copper oxide, in the manner above indicated, thereby increasing its radiating capacity and protecting it against corrosion. The strips having been prepared as indicated and the wire wound thereon are placed side by side on a plate 11, preferably of iron, and having thereon a sheet 12 of asbestus, treated in the same manner as the strips 7, the strips being fastened by screws or other suitable devices passing through and insulated from the iron plate 11. The wires on the several plates are then connected in series, as indicated in Figs. 2 and 4. When, therefore, the source of electricity is connected at the two points 13 13′, the current will meet the resistance of the entire heating-wire. This will produce a certain degree of temperature in the heater, the degree being dependent on the current employed. Intermediate the points 13 13′, preferably at the center of the connected wires, is a connection 14. It will be clear that if one terminal of the source of electricity be connected to this point and the other terminal be connected to the two points 13 13′, the current will pass from point 14 through the two sections of the heating-wire in multiple arc. The current, therefore, meets only one-fourth the resistance of the entire heating-wire, and a large heating effect will be produced.

At the points 13 13′ I place connecting devices, substantially as shown in Fig. 5. 15 is a screw or bolt passing through the strips 7 through a hole in the base, but insulated from said base by the intermediate insulating-sleeve 16, and below said sleeve is placed

a second insulating sleeve or nut 17 and locking-nuts 18. The screw-heads may form the supports for the cooking-vessel. In the upper end of the screw is a slot 19, through which one end of the heating-wire is inserted, whereby electrical connection is made with the screw, and the terminal is extended beyond the bottom of the oven.

In the table or other support 20 for the heater are placed terminals 21 of the circuit. These terminals are preferably cup-shaped or spring terminals, and are so arranged that when the heater is placed in position the screws or bolts 15 will make contact with the terminals and complete the circuit. If it is desired to connect the source of electricity to the heater without the use of this automatic connector 15 21, the wire 22 from the source may be passed through the slot 19, as indicated at the left of Fig. 5, with the end of the heating-wire. When the screw is fully inserted, the two wires will be clamped together and electrically connected.

To control the circuits of the heater, I employ a switch which may be of the form shown at the right of Fig. 2. The switch is composed of four contacts 23, 23′, 23″, and 23‴ and pivoted arm 24, carrying contact plates or springs 25 26, each connected to a terminal of the source of electricity. From the left contact 21 wire 22 leads to contact 23′. From the right contact 21 a wire 22′ leads to contact 23 and 23‴, respectively. From the central point 14 a wire 22″ leads to contact 23″. With the switch in the position shown in the drawings the circuit is as follows: positive pole of the generator to contacts 25 23′, wire 22, through all the wires of the heater in series to wire 22′, and contacts 23‴ 26 to the negative pole of the generator. As above described, this circuit-connection produces a gentle heat, and this effect is shown by the indicator placed adjacent to the switch-handle. When the switch-arm is moved adjacent to the indication "high heat," springs 26 and 25 move from the position shown, 26 making contact with 23″ and 25 electrically connecting 23 and 23′. In this position the circuits will be as follows: positive pole of the battery, contact 25, where the circuit divides, one branch being contact 23′, wire 22, one half the heating-wire to point 14, thence by wire 22″ to 23‴, the other branch being from contact 23 through the wire 22′, the other half of the heating-wire to the point 14 to contact 23″, and back to the negative pole of the battery. To throw the apparatus out of use, the switch is turned in the opposite direction, as shown by the words "Cut off" in the indicator.

The operation of the apparatus which has thus been described is obvious and need not be further explained.

Having thus described my invention, what I claim is—

1. In an electrical heater, the combination of a casing or oven, a removable cover therefor, and a removable bottom consisting of the heating-conductor and its supporting devices, substantially as described.

2. In an electrical heater, the combination of a casing or oven, a removable cover, a removable bottom consisting of the heating-conductor and its supports, and an interior cooking-vessel slightly smaller than the oven, the bottom of the vessel being over the heating-conductor, substantially as described.

3. In an electrical heater, the combination of an oven, a removable cover, a removable bottom consisting of the heating-conductor and its supports, and an interior cooking-vessel smaller than the oven and having a projecting flange resting on the oven, substantially as described.

4. An electrical heater consisting of strips of heat-resisting material provided with teeth or pins on its edges and a heating electrical conductor wound back and forth across one face of the strip around the teeth, substantially as described.

5. An electrical heater consisting of a strip of heat-resisting material provided with teeth or pins on its edges and a heating electrical conductor wound back and forth across one face of the strip and around the teeth, spaces being left at intervals to accommodate fastening devices for the strip, substantially as described.

6. An electrical heater consisting of a strip of heat-resisting material of asbestus hardened by sulphate of copper or similar material provided with teeth on its edges and a heating electrical conductor wound back and forth across one face of the strip, substantially as described.

7. In an electrical heater, the combination, with a bottom plate and a covering of asbestus or similar material, of a heater consisting of strips of heat-resisting material, on one surface of which is mounted a heating-conductor with terminals for connection to a suitable circuit, substantially as described.

8. The combination, with a support in which are mounted circuit-terminals, of the bottom plate of the heater, the heating-conductor supported thereon, and the terminal extensions passing below but insulated from the plate and making contact with the first-mentioned terminals, substantially as described.

9. The combination, in a heater, of the metal plate 11, the coating of prepared asbestus 12, the strips 7, with heating-wire wound thereon, as described, and the terminals 13 13′, insulated from the metal plate, substantially as described.

10. The combination of a plate or similar support having a hole therein for the passage of a screw, a screw having a slot for the reception of circuit-terminals, and a clamping-nut, substantially as described.

11. The combination of screw or bolt 15, having a slot near the end thereof, the wire

or wires passing through said slot, the insulating nuts or washers 16 17, and clamping-nut 18, substantially as described.

12. The combination of an electrical heater having within it heating conductors or sections adapted to be connected in different ways to the supply-circuit, a switch for controlling said connections, and an indicator operated by movement of the switch to indicate how the connections stand, substantially as described.

13. A heating-conductor for electrical heaters, consisting of German silver or other suitable conductor having a coating of oxide, substantially as described.

14. The combination, with an electrical heater, of the plate immediately over the heater, one face of which is coated with copper oxide, substantially as described.

15. The method of preparing asbestus for supporting the heating-conductor of an electrical heater or similar purpose, consisting in treating asbestus with a non-hygroscopic and heat-resisting material, such as copper sulphate, and drying the same under pressure, substantially as described.

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

JOHN V. CÂPEK.

Witnesses:

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