

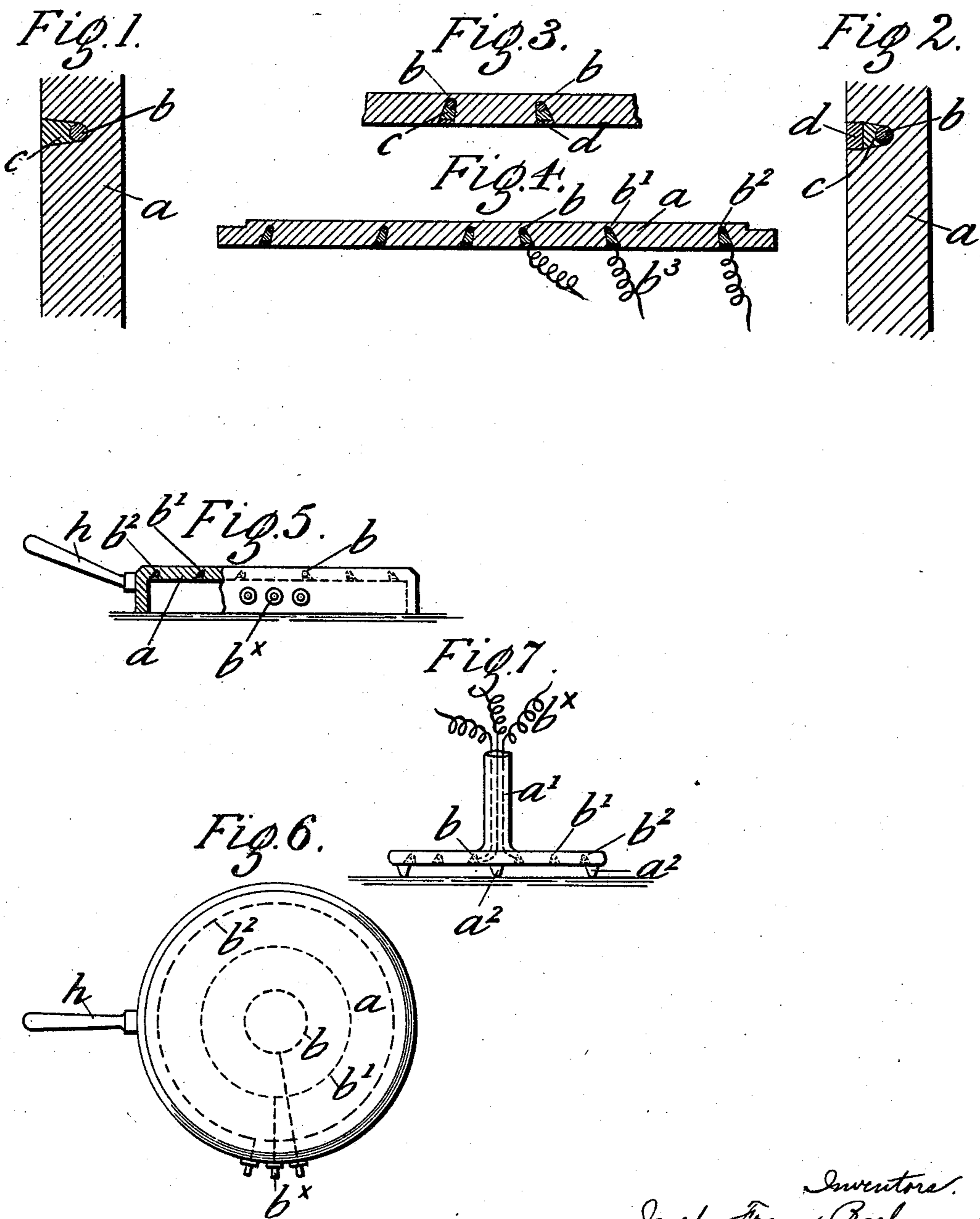
No. 692,413.

Patented Feb. 4, 1902.

J. F. BACHMANN & A. VOGT.
ELECTRIC HEATER.

(Application filed Dec. 12, 1899.)

(No Model.)



Witnesses:
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Att'y

UNITED STATES PATENT OFFICE.

JOSEF FRANZ BACHMANN AND ADOLF VOGT, OF VIENNA, AUSTRIA-HUNGARY, ASSIGNORS TO THE ELECTRIC RESISTANCE AND HEATING COMPANY, LIMITED, OF LONDON, ENGLAND.

ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 692,413, dated February 4, 1902.

Original application filed November 22, 1898, Serial No. 697,191. Divided and this application filed December 12, 1899. Serial No. 740,101. (No model.)

To all whom it may concern:

Be it known that we, JOSEF FRANZ BACHMANN, residing at 81 Kaiserstrasse, Vienna VII, and ADOLF VOGT, residing at 41 Zenta-
5 gasse, Vienna V, in the Empire of Austria-Hungary, citizens of Germany, have invented a certain new and useful Electric Heater, of which the following is a specification.

This invention relates to electrical heating
10 apparatus preferably made of a compound of conductive and refractory non-conductive substances produced in the manner described in our United States Patent No. 642,414, dated January 30, 1900, by mixing together
15 a conductor, such as carbon or metal, and a non-conductor, such as kaolin, with water or other liquid to form a paste which after molding and drying is heated to a high degree while embedded in carbon powder or sur-
20 rounded by reducing-gases.

The present invention, which was originally included in application Serial No. 697,191, has for its object the manufacture of heating apparatus of the above-described kind, made of
25 a plate, disk, or slab form, on which receptacles containing substances to be heated, such as food, are placed, the said plate, disk, or slab shaped apparatus being heated to any required degree by means of an electric cur-
30 rent conveyed to conducting-contacts which are embedded in the heater-body at different points. It is to be understood that these conducting-contacts do not serve themselves for heating the apparatus, but merely to convey
35 the current to the compound, which becomes heated by the resistance which it offers to the passage of the current. The said conducting-contacts may be of different kinds of material, according to the purpose to which the
40 apparatus is to be applied, in particular of a refractory metal, and they may be in the form of wires, twisted strands, sheet metal, &c. They are preferably secured by a suitable cementing material, to be presently described,
45 in grooves or recesses formed in the body of the stone compound.

That our invention may be fully understood, we will describe the same in detail,

reference being had to the accompanying drawings, in which—

Figures 1, 2, and 3 show fragmentary sections, and Fig. 4 a cross-section, of an electric heater embodying our invention. Fig. 5 is an elevation, partly in section, and Fig. 6 a plan view, of one form of electric heater; and
55 Fig. 7 shows in elevation another form embodying our invention.

As shown in Figs. 1 to 4, we embed the electric conductors or contacts *b*, that serve to supply current to the heater, in grooves of
60 increasing cross-sectional area in an outward direction, said conductors being secured in close contact with the body *a* by filling the remainder of the groove with a cement *c*. This mode of securing the conductors is of
65 advantage in the case of heating apparatus which are not to be coated with a glaze or other refractory material, although it is also applicable where such a coating is used. In many cases, however, it is desirable for fa-
70 cilitating the cleaning of the apparatus that the surfaces thereof should be smooth and also that said surfaces should have a different color from that of the heater-body itself. In such cases the apparatus are either glazed,
75 vitrified, or enameled, and in this case said grooves are filled in as shown at Fig. 2—namely, the conductor *b* is first secured in position by means of a cementing medium *c*, which may be of a conductive compound, and
80 the remainder of the groove is filled in with a compound *d*, which is of the same composition as that of the body *a*. The conducting-cement *c* is mainly either of carbon or of metal, to which is added the usual substances
85 serving as cementing media, such as sugar, gum, tar, water-glass, various metallic oxids or salts, &c. In the case of horizontal slab or plate shaped heaters in which the grooves for the conducting-contacts are made on the
90 under surface it is preferred to make such grooves in inclined positions relatively to such under surface, as shown in Figs. 3 and 4, in order to prevent as much as possible the loosening of the contacts *b* and the ce-
95 ment filling *c* and *d* in the grooves before the

coating of glaze is applied when such is used. The annular grooves are for this purpose inclined toward a central point situated above the center of the disk or slab, so that when the annular contact-wire b is fitted tightly at the bottom of the groove the conicity of the sides of the latter will effectually prevent the conductor from slipping downward.

The above-described method of filling the outer part of the groove with a cement composed of the artificial-stone compound itself insures the effectual and uniform adhesion of the subsequent glazing or enamel.

The apparatus may of course first be prepared with a ground glaze, on which may then be applied any desired ornamentation, coloring, gilding, silvering, &c., such as has heretofore been applied to glazed goods generally.

Figs. 4 to 7 of the accompanying drawings show several forms of heating apparatus constructed according to this invention. Fig. 4 shows a section through a heating-plate a , formed of the compound hereinabove referred to, in the under side of which are formed a series of annular grooves for the reception of annular contact-wires b b' b^2 . These grooves are formed with an inclination toward a point above the center of the plate for the purpose hereinbefore described. After the introduction of the annular conductors the grooves are filled in with cement and the slab is coated with a glaze or an enamel. By means of the wire leads b^3 , which connect the annular contacts with the electric circuit, the current can be passed either through all the conductors or only through one or more of them, according to the degree of heat required. When being used, the plate or slab is placed upon a base formed of a bad conductor of heat, or it may be permanently fixed in a stand of such material, and such stand may be adapted to carry two or more such plates or slabs of the same or of different sizes, so as to form an electrical hearth. Figs. 5 and 6 show a modified form of plate or slab shaped heater, in which this is formed with a downward-projecting rim serving as a foot and provided with a handle h , of insulating material, stopper-contacts being provided at b^x , whereby the current can be conveyed to either one or other of the annular conducting-contacts b b' b^2 , according to the degree of heating required. Thus if

the current be led from contact b' to b and b^2 the maximum heating effect will be obtained, while if it be passed from b' only to b a correspondingly less amount of heat will be produced, or it can be passed from b to b^2 , in which case the minimum amount of heat will be generated. The heater can be placed with its rim upon a table or other support, as such foot, although made of the same material as the slab, will not become appreciably heated by conduction from the latter. The rim could also be made entirely of a non-conducting refractory material—such as clay, porcelain, or the like—and be fixed to the slab a in any well-known manner. Fig. 7 shows another form of the plate or slab heater, in which the heater-plate is of discoidal form and the wire leads b^x for conveying the current to the annular conducting-contacts b b' b^2 are led, insulated, up through a stem a' , which serves as a handle. The ends of the leads may be connected to stopper-contacts provided on the handle. The plate or slab a is formed with feet a^2 . It may be employed either for heating liquids by being immersed in a vessel containing the same, or the objects to be heated may be placed thereon, as in the previous arrangements.

Having thus described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

An electric heater comprising a body composed of a mixture of an electrically-conductive and non-conductive substance and having one or more circular, inclined grooves therein substantially V shape in cross-section, metallic conductors in said grooves held in place by the conicity formed by the sides of said circular grooves, an electrically-conductive cement covering the wires in said grooves, means for placing the wires in an electric circuit and a cement covering said first-mentioned cement to fill said grooves and of the same material as the heater, substantially as set forth.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JOSEF FRANZ BACHMANN.
ADOLF VOGT.

Witnesses:

GERALD. L. SMITH,
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