906,990.

C. D. BABCOCK.

ELECTRICAL HEATING APPARATUS.

APPLICATION FILED JULY 24, 1907.

Patented Dec. 15, 1908

2 SHEETS—SHEET 1.

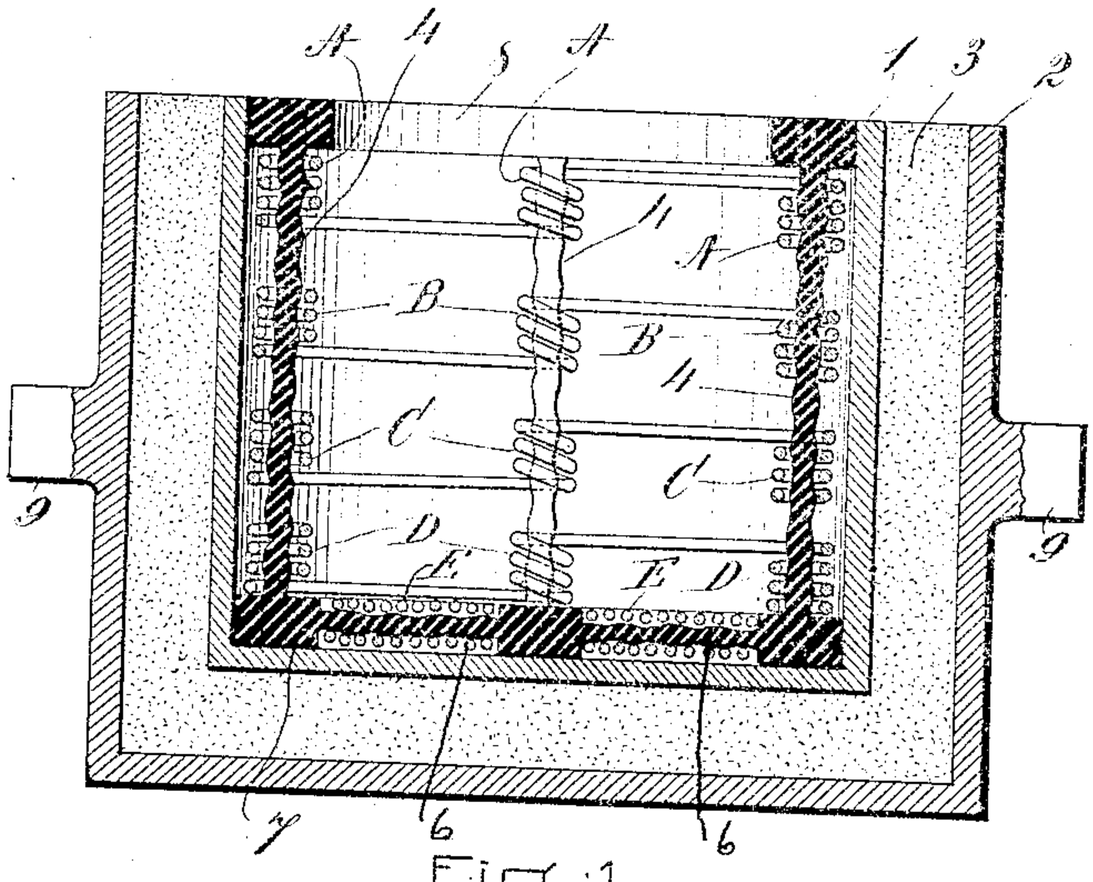

Fig. 1.

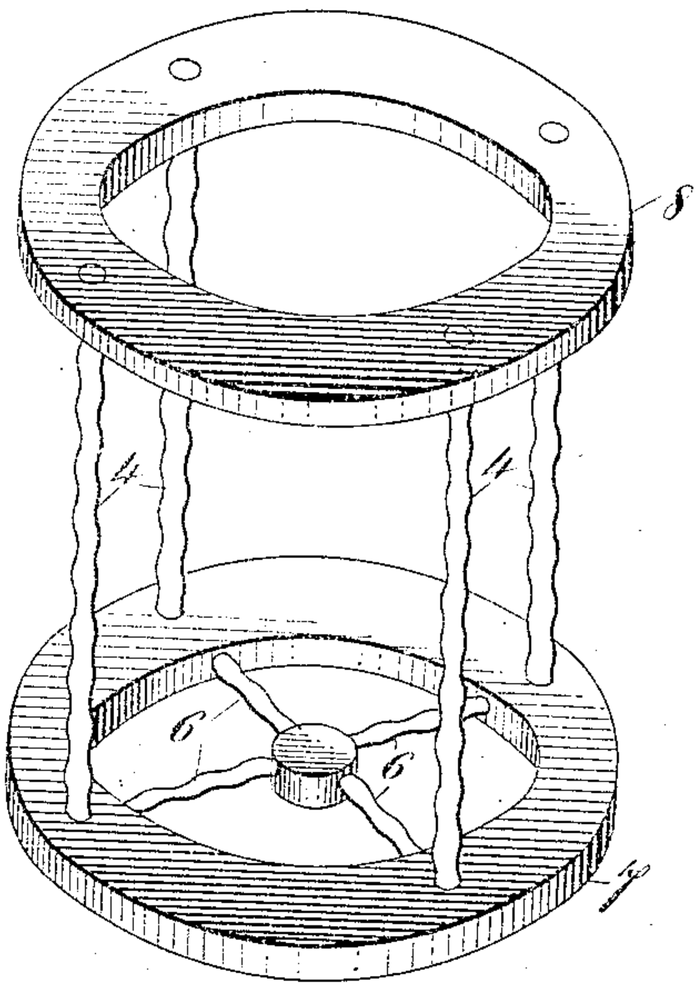

Fig. 2.

WITNESSES:

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E. B. Tomlinson

INVENTOR:

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2 SHEETS—SHEET 2.

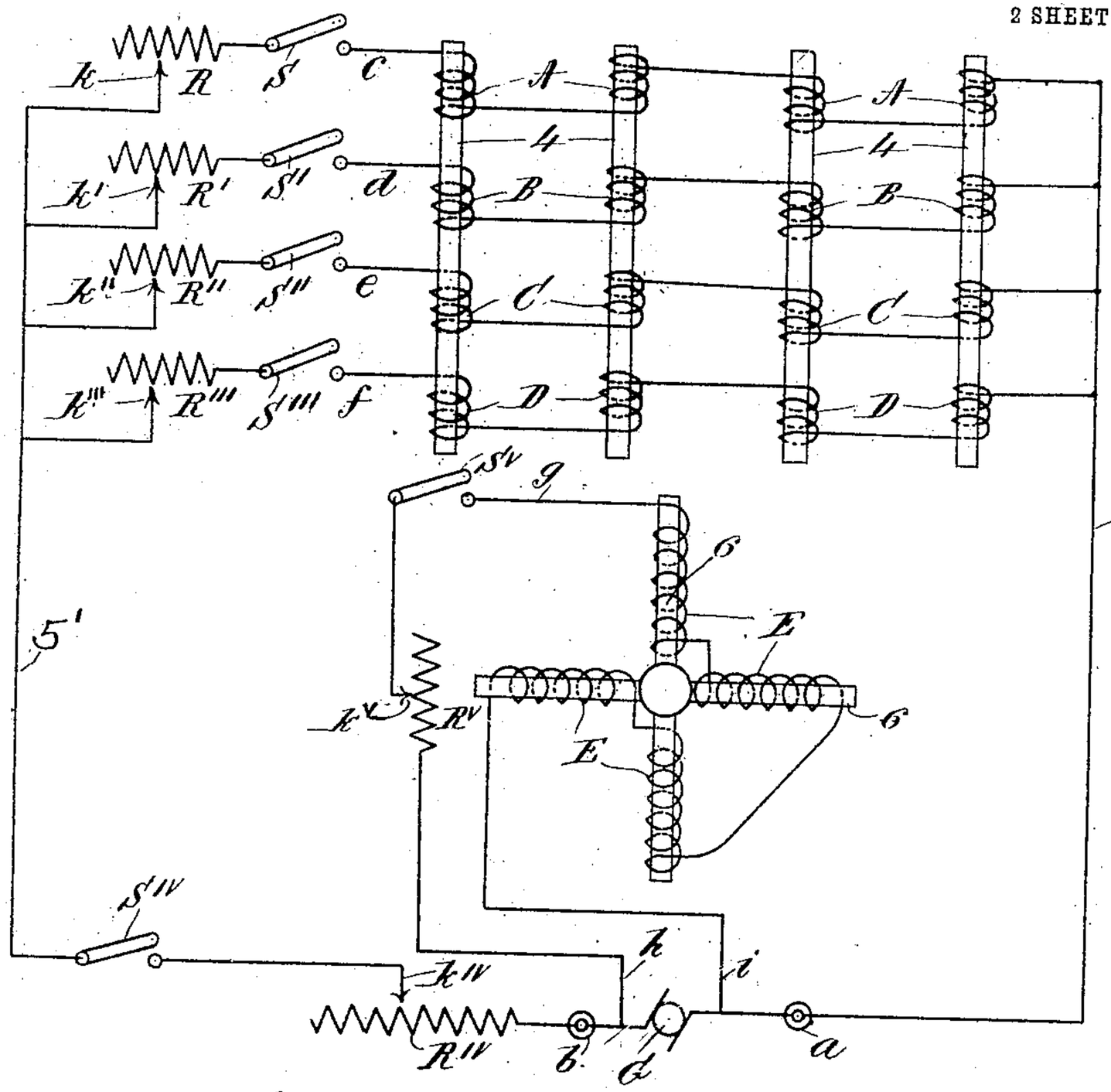

Fig. 3.

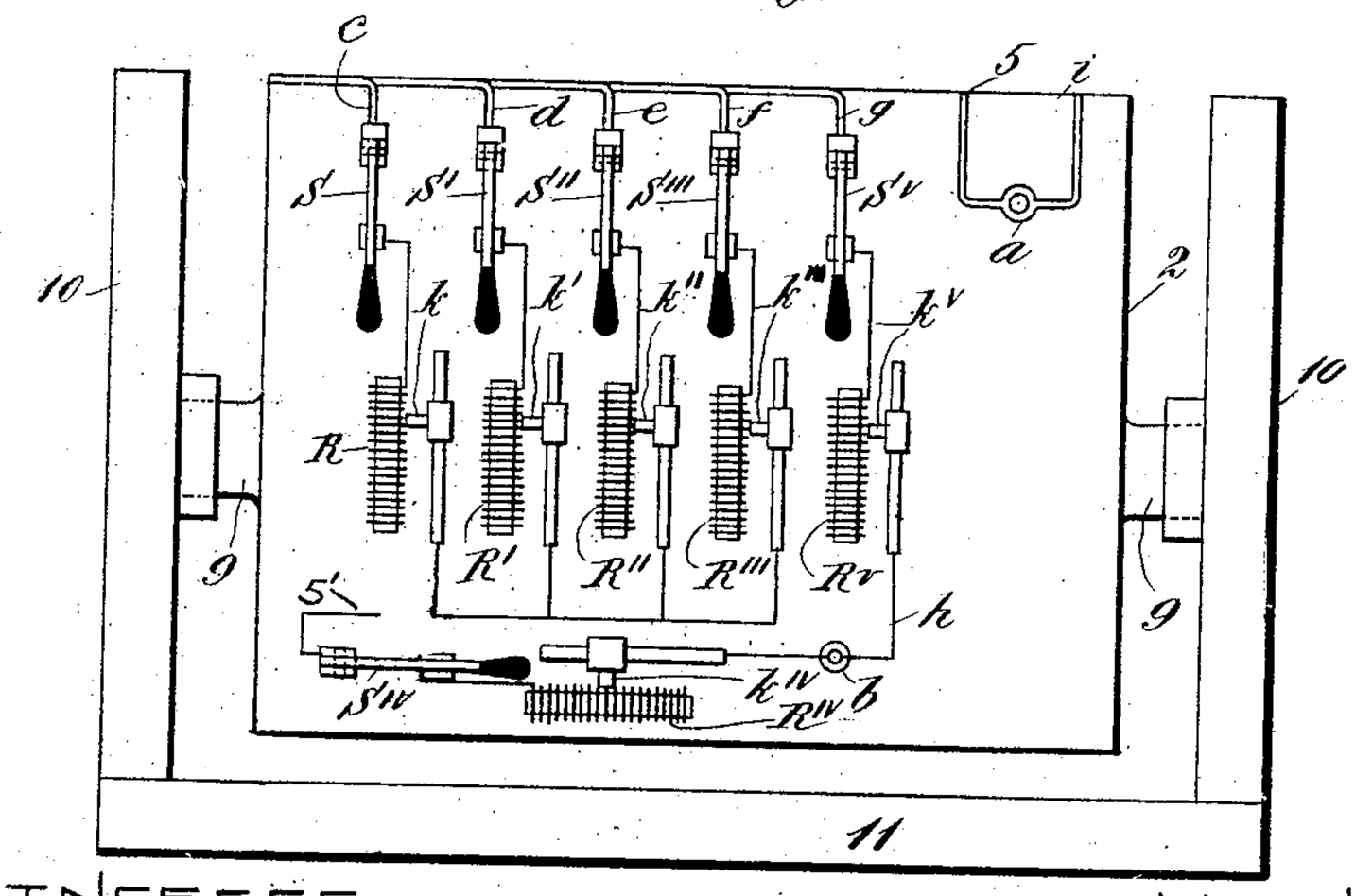

Fig. 4.

WITNESSES=

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UNITED STATES PATENT OFFICE.

CLIFFORD D. BABCOCK, OF NEW YORK, N. Y., ASSIGNOR TO UNITED WIRELESS TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF MAINE.

ELECTRICAL HEATING APPARATUS.

No. 906,990. Specification of Letters Patent. Patented Dec. 15, 1908.

Application filed July 24, 1907. Serial No. 385,260.

To all whom it may concern:

Be it known that I, CLIFFORD D. BABCOCK, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a new and useful Improvement in Electrical Heating Apparatus, of which the following is a specification.

My invention relates to electrical heating apparatus and more especially to apparatus for heating and melting waxes, paraffins, and insulating compounds of inflammable nature, although, as will be obvious, my invention may be used for many other purposes.

The object of my invention is to produce an electrical heating apparatus by means of which the development of heat may be easily controlled and a saving of electrical energy effected by varying in the manner hereinafter more fully described the effective number of heating units or groups thereof.

With this object in view my invention comprises a vessel which may be pivotally supported in a standard and in which are mounted a plurality of heating units, such as resistance coils, so constructed and arranged that any one of said heating units or groups thereof may be independently connected with a source of electrical energy and when so connected, the amount of current flowing therethrough regulated and adjusted to suit existing conditions.

My invention also comprises the novel arrangement and combination of parts hereinafter described and set forth in the appended claims.

In the drawings which accompany and form a part of the present specification, I have illustrated one embodiment of my invention which has given good results in practice, although it will be understood that I do not limit myself to said particular embodiment inasmuch as many modifications may be made therein without departing from the principle of my invention.

In the drawings, Figure 1 represents a central vertical section of an electrical heating apparatus constructed in accordance with the present invention. Fig. 2 is a perspective view of the insulating supporting-member for the heating units. Fig. 3 is a diagram showing one arrangement of circuits that may be employed. Fig. 4 is a front elevation of the apparatus shown in Fig. 1, supported in a standard.

In the figures, 1 represents a vessel of any suitable material adapted to receive the substance to be melted, in that particular embodiment of the invention herein described. 2 is a casing for said vessel, and 3 represents a packing of sand, mineral wool, or other heat insulating material. The casing 2 may be provided with trunnions 9, 9, so that the apparatus may be pivoted in a suitable standard 10, 11, as shown in Fig. 4, for the purpose of more easily emptying the vessel 1 of its molten contents.

Mounted in the vessel are the vertically disposed insulating members 4 4 of lavite, unglazed porcelain, or any other substance which is insulating and non-inflammable. The said members 4 are shown herein as secured to the rings 7 and 8 and the horizontally disposed members 6, 6, also of insulating material may be secured to the lower ring 7, so that when the supporting member formed by said rings and members 4, 6, is mounted in the casing 1, the members 6, 6, will be near the bottom of said casing. It will be understood however that any other suitable arrangement of means for supporting the heating units may be employed.

A number ot heating units or groups thereof, A, B, C, D, herein shown as resistance coils, may be supported by the vertically arranged members 4, and one or more heating units or coils E E may be supported by the horizontally arranged members 6.

When the vessel is only partly filled with a substance to be melted, as for example, an insulating compound, it is desirable to cut out of circuit those resistance units in the upper portion of the heating apparatus, for the purpose of saving electrical energy. One convenient arrangement for effecting this result is shown in diagram in Fig. 3, in which the four groups of heating coils, A, B, C, and D, each group consisting, as shown, of four heating units, are placed in parallel circuits, each of which includes a switch, S, S′, S″, S‴. For the purpose of independently varying the current flow through each heating unit, or group thereof, each one of said parallel circuits may contain a rheostat R, R′, R″, R‴, having adjustable contact members *k*, *k′*, *k″*, *k‴*, respectively. The said parallel circuits are provided with connections 5 5′ to the binding posts *a b*, to which connect the poles of the generator G or other suitable source of electrical energy. These

connections may include the switch S^{iv} and the rheostat R^{iv} having an adjustable contact k^{iv}, said rheostat simultaneously controlling the flow of current to all the coils or groups of coils that may be connected in circuit. The horizontally arranged windings E may be connected with the binding posts *a*, *b* by the wires *i*, *h*, which may include the switch S^{v} and the rheostat R^{v} having the adjustable contact k^{v}.

Although the circuit controlling arrangements above described may be associated with the heating apparatus in any suitable manner, I find it convenient, with the particular form herein disclosed in which the apparatus is pivotally attached to a stationary member, to attach the circuit controllers to the outside of said casing 2 in the manner shown in Fig. 4, in which the letters of reference are identical with those employed in Fig. 3. The connections *c*, *d*, *e*, *f*, *g* from the switches to the heating coils may be arranged as shown in Fig. 4 along the top portion of the vessel 2, each said conductor passing into said vessel and making connection with its respective coil, as indicated in Fig. 3.

I claim:

1. In an apparatus for heating insulating compounds, the combination of a vessel for holding said compounds; a plurality of groups of heating units located one above the other in said vessel; and means whereby an upper group may be cut out when the material to be heated does not reach the same, substantially as described.

2. In an apparatus for heating insulating compounds, the combination of a vessel for holding said compounds; a plurality of bare uninsulated coils arranged one above the other in said vessel; and means for cutting out the uppermost coils when the material to be heated does not sufficiently fill the vessel to reach the same, substantially as described.

3. In an apparatus for heating insulating compounds, the combination of a vessel for holding said compounds; a plurality of bare uninsulated coils arranged one above the other in said vessel; a frame of insulating material carrying said coils; and means for cutting out the uppermost coils when the material to be heated does not sufficiently fill the vessel to reach the same, substantially as described.

4. In an apparatus for heating insulating compounds, the combination of a vessel for holding said compounds, a casing provided with trunnions for holding said vessel; a suitable support in which said trunnions pivot; a source of electrical energy; a plurality of groups of heating units arranged one above the other in said vessel; and means for cutting out the uppermost units when the material in the vessel does not reach the same, substantially as described.

5. In an apparatus for heating insulating compounds, the combination of a vessel for holding said compounds; a casing provided with trunnions for holding said vessel; heat insulating means between said casing and vessel; a suitable support in which said trunnions pivot; a source of electrical energy; a plurality of groups of heating units arranged one above the other in said vessel; a suitable insulating frame on which said units are mounted; and means for cutting out the uppermost units when the material in the vessel does not reach the same, substantially as described.

6. In an apparatus for heating insulating compounds, the combination of a vessel for holding said compounds; a casing provided with trunnions for holding said vessel; heat insulating means between said casing and vessel; a suitable support in which said trunnions pivot; a source of electrical energy; a plurality of groups of heating units arranged one above the other in said vessel; a suitable insulating frame on which said units are mounted consisting of the vertical members 4, 4, and the horizontal rings 7 and 8; and means for cutting out the uppermost units when the material in the vessel does not reach the same, substantially as described.

7. In an apparatus for heating insulating compounds, the combination of a vessel to hold said compounds; a plurality of heating units located in said vessel one above the other; a plurality of parallel circuits in which said units are included; a switch and a rheostat in each circuit; a source of electrical energy; connections from said parallel circuits to said source; and a switch and rheostat in said connections, the whole being so arranged that the uppermost units may be cut out when the material in the vessel does not reach the same, substantially as described.

8. In an apparatus for heating insulating compounds, the combination of a pivoted vessel to hold the same; a plurality of heating units arranged one above the other in said vessel; and means mounted on the pivoted vessel for cutting out the uppermost units when the material does not reach the same, substantially as described.

9. In an apparatus for heating insulating compounds, the combination of a pivoted vessel to hold the same; a plurality of bare, uninsulated heating units arranged one above the other in said vessel; a frame of insulating material on which said units are mounted; and means mounted on the pivoted vessel for cutting out the uppermost units when the material does not reach the same, substantially as described.

10. In an apparatus for heating insulating

compounds, the combination of a pivoted vessel to hold the same; a casing surrounding said vessel; heat insulating material between said vessel and casing; a plurality of bare, uninsulated heating units arranged one above the other in said vessel; a frame of insulating material on which said units are mounted; and means mounted on the pivoted vessel for cutting out the uppermost units when the material does not reach the same, substantially as described.

11. In an apparatus for heating insulating compounds, the combination of a pivoted vessel to hold the same; a plurality of heating coils arranged one above the other in said vessel; a suitable frame on which said coils are mounted; and a switch and rheostat for each coil mounted on the vessel, whereby the current through each coil may be controlled and those coils with which the material does not contact may be cut out, substantially as described.

In testimony whereof, I have hereunto subscribed my name this 2nd day of July 1907.

CLIFFORD D. BABCOCK.

Witnesses
THOS. McGRATH,
LETITIA M. HODGINS.