Aug. 11, 1931. H. G. CAMPBELL 1,818,789

ELECTRIC FURNACE

Filed Oct. 9, 1929 3 Sheets-Sheet 1

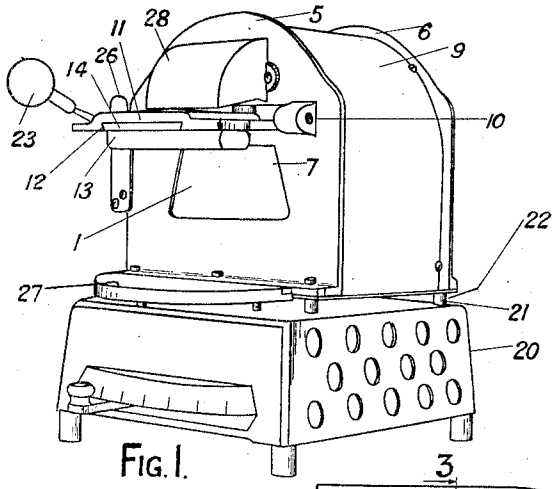


FIG. 1.

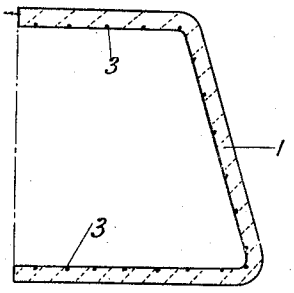


FIG.

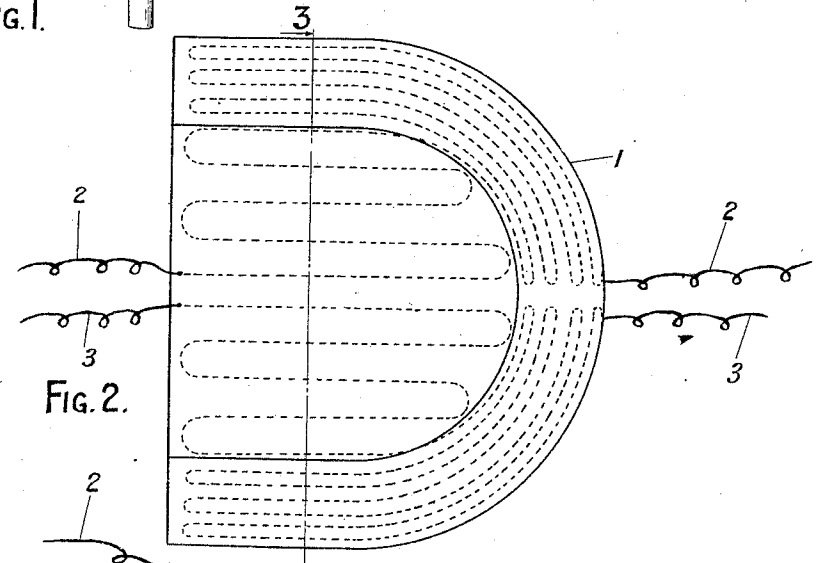


FIG. 2.

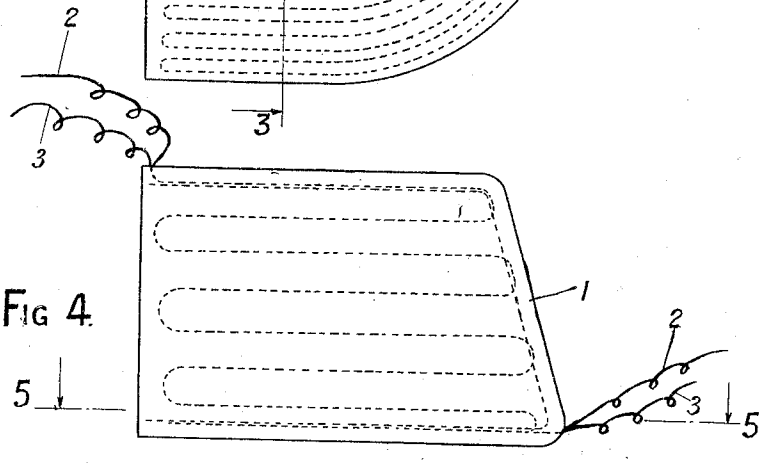


FIG 4.

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ELECTRIC FURNACE

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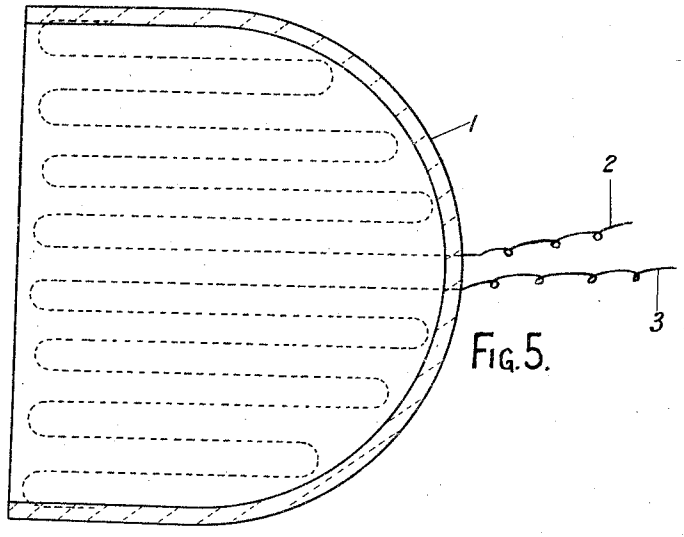


FIG. 5.

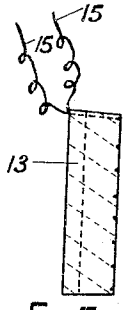


FIG. 7.

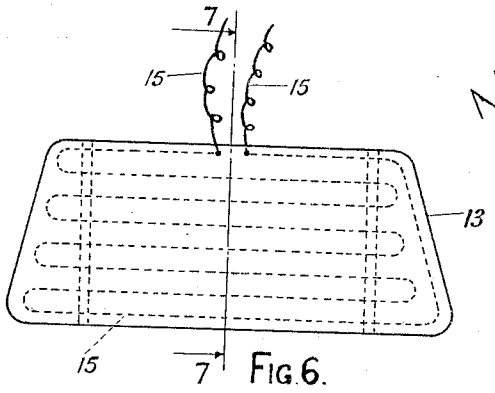


FIG. 6.

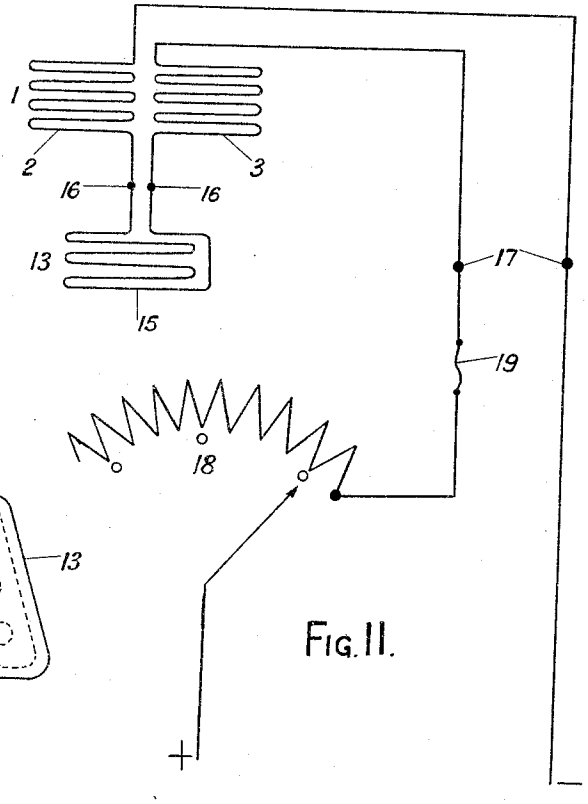


FIG. 11.

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ELECTRIC FURNACE

Filed Oct. 9, 1929 3 Sheets-Sheet 3

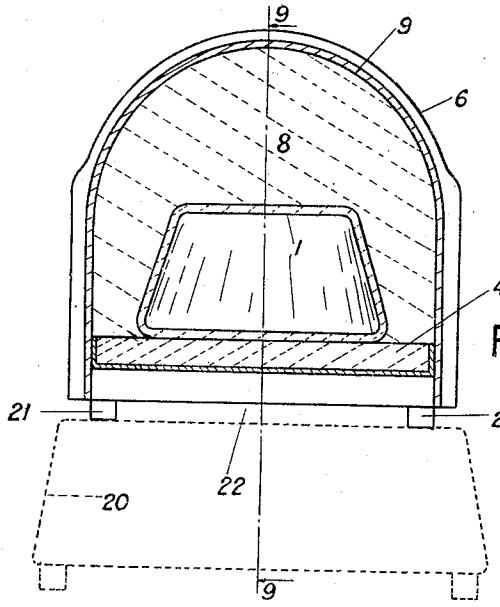


FIG. 8

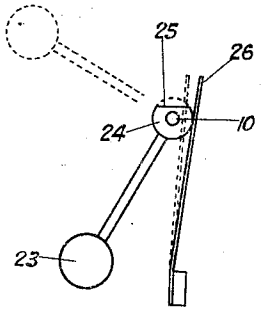


FIG 10.

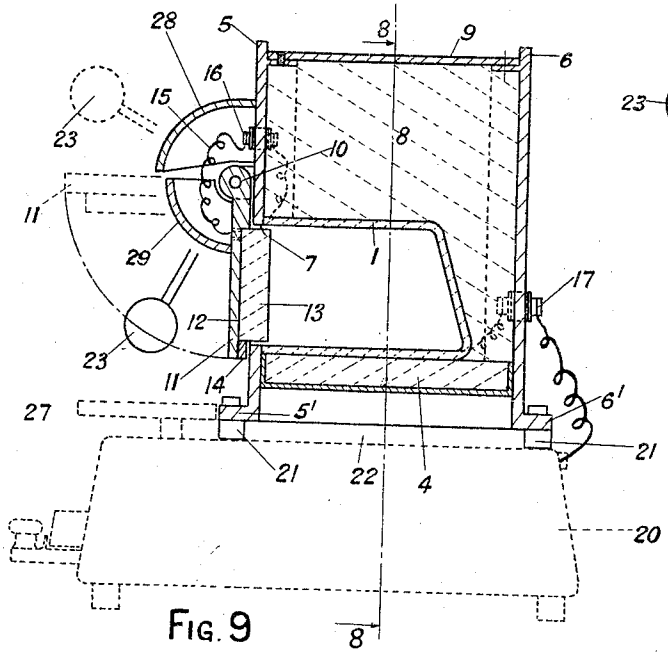


FIG. 9

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UNITED STATES PATENT OFFICE

HENRY GORDON CAMPBELL, OF DUNDEE, SCOTLAND

ELECTRIC FURNACE

Application filed October 9, 1929, Serial No. 398,513, and in Great Britain May 15, 1929.

This invention relates to an improved electric muffle furnace to be used for dental and other purposes involving the fusing of porcelain or other material.

According to the invention a current-carrying wire or wires is or are embedded in the walls of the muffle proper and a current carrying wire is distributed in the muffle door, the said wires being so electrically connected that current passes simultaneously through all said wires, whether the muffle door is open or closed.

The muffle proper is of improved design, being of substantially hoof-shape, broader at the base and narrower at the top.

With the described arrangement the heat is distributed in all directions and maximum heating efficiency is obtained.

In the accompanying drawings Fig. 1 is a perspective view of an electric furnace according to the invention, the muffle door being shown in open position; Figs. 2–5 are detail views showing the disposition of the electric heating elements; Fig. 2 being a plan view, Fig. 3 a fragmentary section on the line 3—3 of Fig. 2, Fig. 4 a side elevation and Fig. 5 a horizontal section on the line 5—5 of Fig. 4; Figs. 6 and 7 are detail views of a refractory slab forming a lining for the muffle door, showing the arrangement of the heating element therein, Fig. 6 being a view looking on the inner face of the slab and Fig. 7 a section on the line 7—7 of Fig. 6; Fig. 8 is a transverse section of the furnace on the line 8—8 of Fig. 9; Fig. 9 is a longitudinal section of the furnace on the line 9—9 of Fig. 8; Fig. 10 is a fragmentary detail view of control means for the muffle door; Fig. 11 is a conventional electric circuit diagram.

The furnace shown comprises a substantially hoof-shaped muffle 1 having walls of refractory material in which are embedded, adjacent to the inner surface of the muffle, two heating elements comprising conductors 2, 3 (Figs. 2–5) each of which is led zig-zag along the roof, bottom and side walls of one half of the muffle. The muffle proper is mounted upon a refractory tray 4 (Figs. 8 and 9) sustained between spaced end-plates 5, 6 of which the end-plate 5 is formed with an opening 7 in register with the mouth of the muffle 1. The space 8 above the muffle and bounded by the end-plates 5, 6 and an inverted U-shaped casing 9 bridging the end-plates is filled with refractory material. Hinged at 10 to the end plate 5 is a muffle door 11 in the inner face of which is a dove-tailed recess 12 (Fig. 1) in which is fitted a renewable refractory slab 13 (Figs. 1, 6, 7 and 8) adapted to enter the furnace mouth. The slab 13 is retained in position in the recess 12 by a key 14. Led zig-zag over the inner face of the slab 13 is a heating element comprising a conductor 15 (Figs. 6 and 7). The end portion of each of the conductors 2, 3 at the mouth of the muffle 1 is clamped to a terminal 16 (Figs. 9 and 11) penetrating but insulated from the end-plate 5. The end portions of the conductor 15 are led through insulation eyelets in the door 11 and clamped one to each of the terminals 16 so that the conductor 15 is in series with the conductors 2, 3. The end portion of each of the conductors 2, 3 emerging from the rear of the muffle is clamped to a terminal 17 penetrating but insulated from the end-plate 6. As shown conventionally in Fig. 11, there are included in the electric supply circuit to the terminals 17 a rheostat 18 and a safety fuse 19, the rheostat 18 being enclosed in a base 20 (Figs. 8 and 9) upon which the furnace is mounted, thermal insulators 21 being interposed between flanges 5′, 6′ on the lower ends of the end-plates 5, 6, respectively, and the base 20. The height of the insulators 21 is such as to provide an air space 22 between the base 20 and the furnace. 23 denotes a weighted manually operable handle secured to the hinge-pin 10 for opening and closing the door 11. For holding the door temporarily in open position, there is secured to one end of the pin 10 a boss 24 (Fig. 10) formed with a flat 25, engageable by a blade-spring 26 carried by the end-plate 5 when the muffle door is in open position as shown in Fig. 1. 27 denotes a refractory tray disposed in front of the furnace mouth. 28, 29 denote coaxial segmental shield plates carried by the end-plate 5 and by the door 11, respectively, and enclos-

ing the electrical connections between the conductor 15 and the conductors 2, 3, the shield plate 29 being of less radius than the shield plate 28 so as to be movable within the shield plate 28 when the door 11 is swung on its hinge.

For use with direct current the negative ends of the heating elements may be thickened.

The spacing of the return bends of the heating elements is such as to prevent any deleterious electrical effects which might tend to shorten the life of the furnace.

As is understood, external metallic parts of the furnace are suitably earthed.

I claim:—

An electric furnace comprising a hoof-shaped muffle, electric heating means embedded in the top, bottom, side and end walls of said muffle, a hinged door controlling the mouth of said muffle, a slab of refractory material forming a lining for said door, adapted in the closed position of said door to project into the interior of said muffle, and electric heating means embedded in said slab in series with said first mentioned means.

In testimony whereof I have signed my name to this specification.

HENRY GORDON CAMPBELL.