Sept. 1, 1925.

1,551,868

C. A. CLARK ET AL

METHOD OF THE APPLICATION AND CONSTRUCTION OF ELECTRICAL HEATING UNITS

Filed Dec. 10, 1919

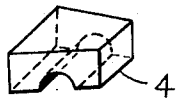

Fig. 1.

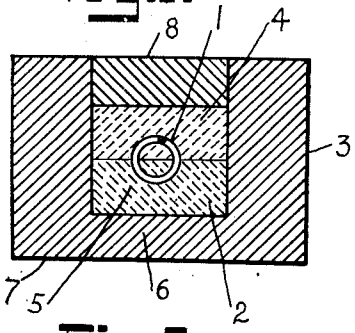

Fig. 2.

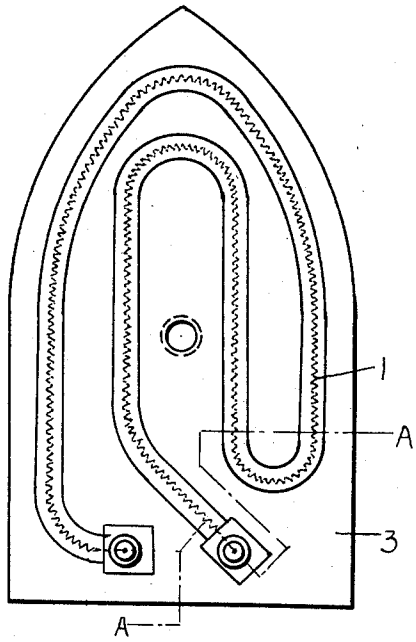

Fig. 3.

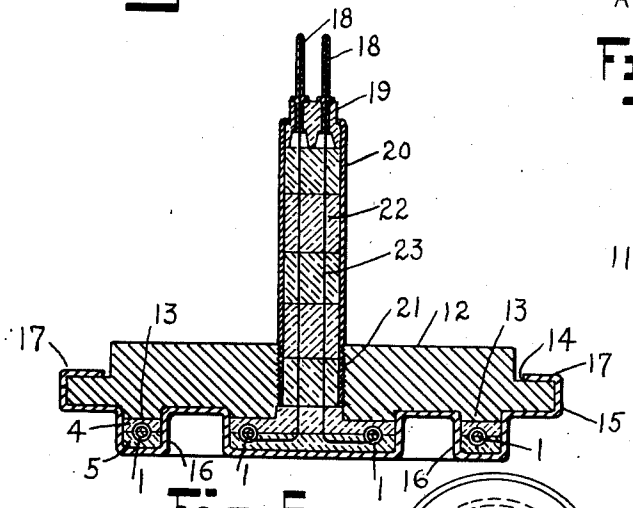

Fig. 5.

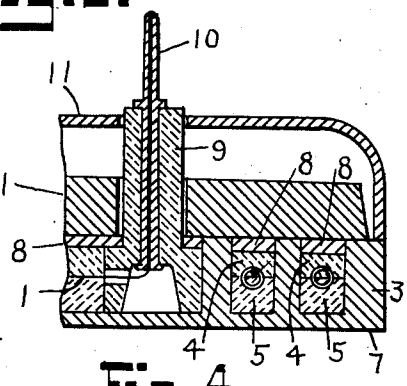

Fig. 4.

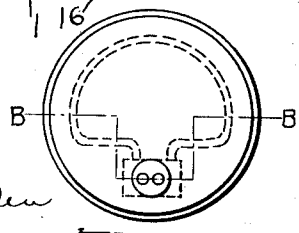

Fig. 6.

WITNESS:

William Kenneth Taylor

Herbert Leonard Pruden

INVENTORS

Charles Albert Clark

Alva Thomas Smith

Patented Sept. 1, 1925.

1,551,868

UNITED STATES PATENT OFFICE.

CHARLES ALBERT CLARK AND ALVA THOMAS SMITH, OF NEW YORK, N. Y.; SAID SMITH ASSIGNOR TO SAID CLARK.

METHOD OF THE APPLICATION AND CONSTRUCTION OF ELECTRICAL HEATING UNITS.

Application filed December 10, 1919. Serial No. 343,976.

To all whom it may concern

Be it known that we, CHARLES ALBERT CLARK and ALVA THOMAS SMITH, citizens of the United States, and residents of New York city, in the county of New York and State of New York, have invented new and useful Improvements in Methods of the Application and Construction of Electrical Heating Units, of which the following is a specification.

This invention relates to the method of the application and construction of electrical heating units which are imbedded in high refractory materials and said refractory materials together with the heating element are imbedded in a metallic mass being held there under pressure by a metallic plate or the like.

Another novel and valuable feature of this invention consists of utilizing a high refractory material of high thermal conductivity in combination with another high refractory material of low thermal conductivity.

The function of these high refractory materials utilized in this combination is to provide a suitable means for maintaining the resistor in a relatively fixed position and to direct the heat in the desired direction.

Another novel feature of this invention consists of the means wherein the resistor together with the refractory materials is imbedded under high pressure into a metallic mass so proportioned that the heat will be transmitted in the desired direction.

This is accomplished by surrounding the heating element on three sides by a metallic mass relatively thick and the fourth side by a mass relatively thin, by placing the low heat conductive refractory material adjacent to the relatively thick mass and the high heat conductive refractory material adjacent to the relatively thin mass, for the purpose of conducting the heat to be utilized in the direction to be desired.

This improved method of heating may be accomplished by using cast metallic materials, stamped or formed metallic materials or high refractory moulded materials, in conjunction with a relatively thin formed or shaped metallic material.

One of the most important features of this invention consists of the form or shapes of the refractory materials whereby the heating element may be easily built up with a positive certainty of locating or centralizing the resistor in the most desirable position and the adaptability of this unique construction which permits the resistor of being surrounded on one side by a high thermal conductive refractory material and on the other side by a low thermal conductive refractory material.

The preferable high refractory materials of high thermal conductivity consists of quartz, talc, fire clay, alundum or any other suitable high refractory material either plastic or nonplastic.

The nonplastic material may be made plastic by the use of suitable binders such as sodium silicate, fire clay or other suitable materials.

The preferable high refractory materials of low thermal conductivity consist of any of the aforesaid in combination with any low thermal conductive material such as asbestos, sil-o-cel or the like.

We have obtained excellent results however with the use of combination of alundum cement and talc for a refractory material of high thermal conductivity and for a refractory material of low thermal conductivity have utilized the aforesaid combination with the addition of asbestos or sil-o-cel.

Another valuable feature of our invention consists of the novel construction of the terminals which are integral with and a part of the heating unit.

The construction of the heating unit is substantially as follows: The resistor is centralized in a recess by a series of prepared shapes consisting of high refractory materials one side of which is formed to receive and centralize the resistor.

These prepared shapes may be rectangular or wedge shaped as may be desired, one series of which shapes being of low thermal conductivity and the other shapes which are

diametrically opposite being of high thermal conductivity.

The shapes are placed in their proper relative position in a cavity and a pressure plate or the like is forced under pressure into the cavity thus forcing and compressing the shapes compactly into the cavity and around the resistor, thoroughly imbedding the resistor, preferably composed of a coil of resistance wire of comparatively small diameter thus incorporating the resistor and the differentiated shapes together with the surrounding mass and the unit terminals into one compact heating unit.

We attain these results by the illustrations in the accompanying drawing where like parts are referred to by similar numerals throughout the drawing, in which:

Figure 1, is an isometric view illustrating one of the shapes of the refractory material.

Figure 2, is a typical section showing the resistor imbedded in the refractory materials.

Figure 3, is a plan view showing the application of this method applied to a laundry iron.

Figure 4, is a section of Figure 3, taken on line A—A

Figure 5, is a section on line B—B of Figure 6, illustrating one application of this construction as applied to an immersion heater.

Figure 6, is a plan view of Figure 5.

The basic construction of this heating unit is substantially as follows, a resistor 1, is imbedded in a cavity or channel 2, in a metallic casting 3, shown in Figure 2, said resistor being centralized by two types of prepared shaped high refractory materials adapted to be crushed and compressed into said cavity and around the resistor on all sides completely imbedding the said resistor.

In Figure 2, the prepared shape 4, surrounding one half of resistor 1, is a high refractory material of low thermal conductivity, and diametrically opposite is a high refractory shaped material of high thermal conductivity and is adjacent to the thinner section of the mass 3, which surrounds the heating element, together with 4 and 5, the other three sides being relatively thicker.

The purpose of this unique construction is to provide better thermal conduction between the resistor 1, and the surface to be heated 7, the remainder of the surrounding mass being of a lower thermal conductivity.

The resistor 1, is centralized in the cavity or channel 2, by the prepared shapes 4 and 5, which are crushed around said resistor 1, by the pressure of the plate 8.

The principal feature of this invention being to construct a heating unit that will transmit the heat from the resistor 1, to the surface to be heated 7, with the least possible amount of thermal resistance, thereby increasing the life of the element and providing a comparatively low resisting path for the heat flow in the desired direction, thus increasing the efficiency of said unit.

The terminal construction as shown in Figure 4, consists of an insulating block or the like composed of porcelain, lava, or other high refractory insulating compositions, which is integral with and a part of the heating unit and carries a terminal 10, attached thereto, through which the resistor 1, passes and is attached thereto either by welding, brazing or clamping.

The iron as shown in section in Figure 4, has a pressure plate 11, which also serves as a weight for the iron and has a cover 12, through which the block 9, and the terminal 10, passes.

Another type of this construction is shown in Figure 5, in section and in Figure 6 in plan view, illustrating an immersion heater.

The basic principle of this heater and the application of the different parts utilized is substantially the same in principle as in the laundry iron, illustrated.

In this immersion heater the cast plate 12, has projections 13, which serve for the same purpose as the pressure plate 8, in Figure 2 and also has a flange 14.

The resistor, together with the prepared shapes 4 and 5, are contained in a channel 16, of the formed sheet metal plate 15, which plate 15, is brazed, soldered, silver soldered, or otherwise hermetically attached to the plate 12, at 17.

The terminals 18, are attached to the insulating block or the like which in turn is attached to the tube 20, screwed into the casting 12, at 21, and the interior of the said tube 20, carries the insulating means 22, through which the resistor 1, or the leads 23, pass to be connected to the terminal 18.

Having thus described our invention and illustrated the same in the accompanying drawing, we do not confine ourselves to the exact means illustrated herein only as the preferred embodiment of the invention, therefore:

We claim:

1. An electric heating unit comprised of a resistor, a grooved metallic base, a plurality of insulating blocks of good heat conductivity in the bottom of said groove, a plurality of insulating blocks of poor heat conductivity in the top of said groove, a resistor or heating wire, each half of which is imbedded in these two different insulating materials and a pressure plate adapted to hold said insulating materials and heating wire under pressure within said groove.

2. In combination, a base, insulating

means adapted to prevent the downward radiation of heat, a heating element, insulating means adapted to rapidly carry heat upwardly and provisions for clamping said elements and means together under pressure.

3. In combination, a holding base, means to prevent downward radiation of heat, a heating element, means to accelerate the upward radiation of heat, and a clamping pressure plate adapted to store up heat.

Dated at New York, N. Y., this the 6 day of Dec., 1919.

CHARLES ALBERT CLARK.
ALVA THOMAS SMITH.