May 14, 1935. C. H. BOYLES 2,001,297

ELECTRICAL RESISTANCE UNIT

Filed Dec. 19, 1931

Fig. 1.

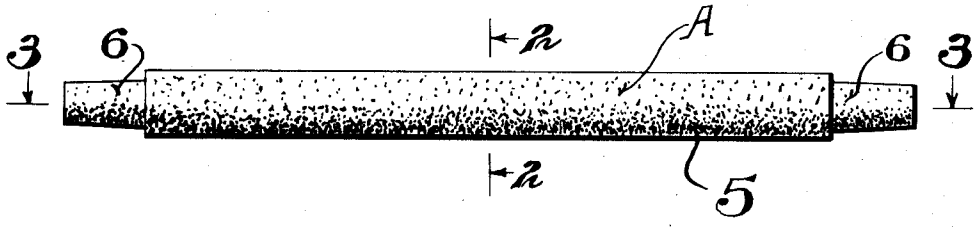


Fig. 2.

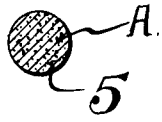
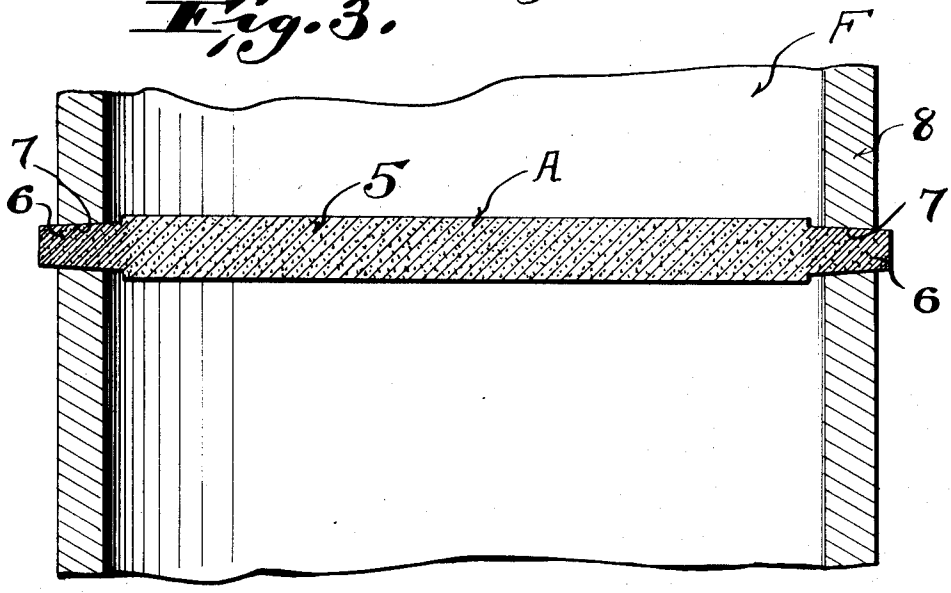


Fig. 3.



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ELECTRICAL RESISTANCE UNIT

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Application December 19, 1931, Serial No. 582,093

1 Claim. (Cl. 201—76)

This invention appertains to new and useful improvements in electrical resistance units utilized for heating purposes.

The primary object of my present invention is to provide an electrical resistance unit embodying contact terminals made an integral part thereof, which have a greater density than the body portion of the unit, whereby to lower the resistance of the terminals, so that when the element or unit is electrified, it will allow the current to flow freely to the body portion thereof, which is of the desired resistance for radiating heat of very high degree.

A further salient object of my invention is to provide a novel means of forming an electrical resistance unit, with end terminal portions of a smaller diameter than the element proper, with a greater density, so as to give a lower resistance and thereby permit the electrical energy to flow freely to the resistance body.

In accordance with my experiments, I found out that it is of the most importance to so construct a resistance element with contact terminals made a part therof, which have a greater density and lower resistance than the heating element proper and to provide a means to connect the power feed wires without having arcing and oxidizing difficulties.

It is, therefore, a further important object of my invention to provide an electrical resistance unit of the above stated character, in which the end terminals are of smaller diameter and of greater density and lower resistance than the body portion of the unit, so as to allow the free flow of the electrical energy to the body without any heat generating qualities at the terminal ends.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described, claimed and illustrated in the accompanying drawing, in which:

Figure 1 is a side elevation of my improved electrical resistance unit;

Figure 2 is a transverse section through the same, taken on the line 2—2 of Figure 1, looking in the direction of the arrows;

Figure 3 is a longitudinal section through the resistance unit taken on the line 3—3 of Figure 1, showing the application of the heating unit to a furnace;

Referring more particularly to the drawing in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter A generally indicates my improved electrical resistance unit and F a furnace or other heat generating appliance with which the unit can be associated.

In accordance with my invention, I provide the heat resistance unit A with an elongated substantially cylindrical body portion 5. This body portion 5 is of comparatively great diameter and of comparatively small density, so as to retard the flow of current therethrough to bring about the heating of the unit. The body portion 5 has formed integral therewith, the terminal end portions 6 which are of a considerable less diameter than the body portion 5. In the forming of my heating unit, these end terminal portions 6 are compressed so that the same will have a greater density than the body portion 5. Obviously, this will lower the resistance of the end terminal portions of the element, so that when the element is electrified, it will allow the current to flow freely to the large center body portion 5.

The terminal end portions 6 can taper slightly toward their free outer ends, if it is sc desired, and these terminal end portions are mounted in suitable openings 7 formed in the walls 8 of the furnace F. The terminals are of a sufficient length, so as to extend beyond the outer face of the furnace walls, whereby electric conductor wires can be readily connected thereto.

With the construction of a heat unit in accordance with my invention, with small terminal end portions having a greater density and lower resistance than the large center portion, the generation of heat at the terminal ends is practically eliminated.

The provision of the reduced terminal ends provide a way for a metallic coating to be put on the terminals which further eliminates the possibility of contact troubles, such as arcing and oxidizing. However, this element can be used with or without metallic coating on the terminals, governed by the application to which the resistance unit is put.

The unit itself is constructed along a novel manner and is formed from ingredients, some of which have been used in the art of resistance units.

In accordance with my invention, I employ silicon carbide, zirconium oxide, carbide of boron, with a suitable binder. These elements are all compounded and mixed together and are molded to the herein described form and embedded in a carbon graphitic compound and heated in a desirable furnace to a unifying temperature.

In different application of this unit, different resistances are needed. In view of this fact, the exact proportions of the ingredients used cannot be conveniently stated, and, obviously, the proportions will vary with the different uses of the unit. However, where resistance of one-and one-half ohms per cubic inch is desired, the following percentages can be successfully employed:

82% silicon carbide
10% zirconium oxide
5% carbide of boron
3% binder

Either one of the carbides can be used as the base and the other used as a fill-in to govern the resistance. Thus, I can employ 82% of carbide of boron and 5% silicon carbide.

Changes in details may be made without departing from the spirit or the scope of this invention, but what I claim as new is:

An electrical resistance heating unit for electrical furnaces and the like comprising, an integral structure including an elongated body portion having its ends compressed to provide conductor terminals of less diameter than the body and of a greater density than the body, said body and ends being formed from the same type of material throughout their entire lengths.

CARROLL H. BOYLES.