O. DALE & H. A. FREDERICK.

ELECTRIC RESISTANCE UNIT.

APPLICATION FILED DEC. 6, 1911. RENEWED OCT. 10, 1913.

**1,096,289.**

Patented May 12, 1914.

Fig. 1.

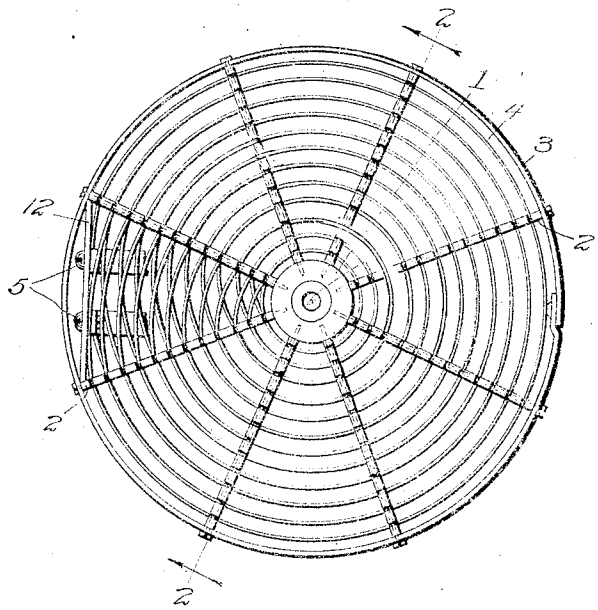



Fig. 4.

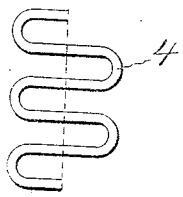



Fig. 3.

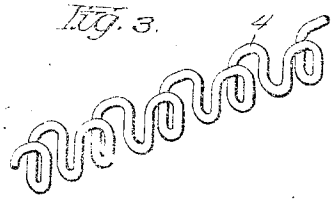



Fig. 5.

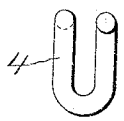
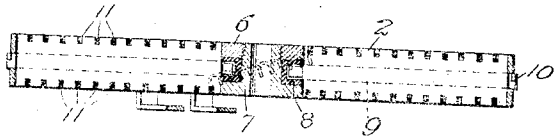



Fig. 2.




Witnesses:

Robert F. Eggers

H. L. Lockwood

Inventors:

Oswald Dale.

Harry A. Frederick

by: Edwin A. Hoag & Jas. J. Hoag

Atty.

# UNITED STATES PATENT OFFICE.

OSWALD DALE, OF NEW YORK, AND HARRY A. FREDERICK, OF TUCKAHOE, NEW YORK.

## ELECTRIC-RESISTANCE UNIT.

1,096,289. Specification of Letters Patent. Patented May 12, 1914.

Application filed December 6, 1911. Serial No. 664,193. Renewed October 10, 1913. Serial No. 794,515.

*To all whom it may concern:*

Be it known that we, OSWALD DALE, a resident of New York, in the county of New York and State of New York, and HARRY A. FREDERICK, a resident of Tuckahoe, in the county of Westchester and State of New York, citizens of the United States, have invented new and useful Improvements in Electric-Resistance Units, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

Our invention relates to electric resistance units.

It has among its objects to provide an improved electric resistance unit.

A further object of our invention is to provide an improved electric resistance unit which is especially adapted to use in connection with electric heating devices and which may be made up in a very rugged and compact form, having a large effective area of resistance material.

Other objects and advantages of our improved construction will hereinafter appear.

In the accompanying drawings we have, for purposes of illustration, shown one form which our invention may assume in practice. Our invention is not, however, limited to this form but may assume other forms.

In the views of these drawings:—Figure 1 shows a conventional top plan view of the unit. Fig. 2 shows a sectional view of line 2—2 of Fig. 1. Fig. 3 shows a perspective view of a section of a preferred form of resistance material. Fig. 4 shows a plan view indicating how the resistance material may be formed. Fig. 5 shows an end elevation of the section shown in Fig. 3.

In these drawings we have, for purposes of illustration, shown a disk shaped unit, including a hub member 1 having a plurality of radial extending arms 2, the ends of which are received in an outer frame or ring 3; a resistance material 4 being wound spirally around upon both surfaces of said unit from the circumference to the center on one side, and from the center to the circumference on the other side, the ends of the resistance material being connected to suitable binding posts 5 preferably carried at the side of the unit. It is obvious, however, that the unit may be made up in a square, oblong or any other preferred form if desired.

In the construction shown, we preferably form the hub member 1 of a plurality of parts. If desired, this hub member may consist of two threaded members 6 and 7, the member 7 having an external screw thread on an extended portion or sleeve, which is arranged to receive the member 6. These members may be either made of metal or insulating material. In a preferred form, the inner ends of the arms 2 are secured between the members 6 and 7, as, for instance, in an insulating material 8. In a preferred form the arms 2 are provided with radially extending metal reinforcing members 9, whose ends extend beyond the bodies of the arms and are housed respectively in the insulation 8 and ring 3 in any suitable manner. In order to allow for expansion, the ribs are preferably fitted loosely in the hub. If desired, the ends may be split and bent over on the outside of the ring as shown at 10 in Fig. 2. The bodies of the arms 2 are preferably formed of an insulating material. If desired, we may use mica as this insulating material. The reinforcing strips 9 are preferably passed down between several sheets of mica or through the sheet of mica so that they form a substantially unitary part of the mica. The metal strip 9 is narrower than the mica sheets on each side thereof, and hence a channel is formed above and below said strip.

In a preferred form the upper and lower edges of the insulating arms are provided with notches 11, which are preferably located as shown in Fig. 2, so as to be substantially opposite each other. The resistance material 4 is preferably formed in a single length, wound spirally in these notches, extending on one of the surfaces of the unit from one of the binding posts 5 spirally around the unit to the center of the same, and then through to the under side of the unit through a diagonally extending strip, as shown in Fig. 2. On the under side this strip is then preferably wound spirally around the unit from the center out and then connected to the other terminal 5. If desired, however, a plurality of shorter lengths may be used.

In a preferred form the resistance material is of the form shown in Fig. 3, wherein a reflexed wire has its convolutions folded longitudinally as, for instance, shown in Fig. 4, so that instead of lying in a single plane the convolutions are bent substantially along a central line, the ends of the same

lying opposite each other in two substantially parallel planes. This resistance wire is preferably wound around upon the insulating arms 2 in such a manner that certain of the convolutions pass through the notches 11 in the arms. If desired, these convolutions may be held snugly in place within the notches by the use of a suitable insulating composition. Said composition or cement is located within the channel formed between the sheets of mica, and filling said channel serves to cover the resistance wire at its points of support. The terminal connections for the device may be made at binding posts 5 located at one side of the device and supported upon a chord like support 12, between certain of the radial arms 2 so that the connections may be readily made to the unit, when desired.

By our improved construction we have provided an electric resistance unit of an extremely rugged construction, which may be made up in a very compact form and which has a large area of resistance material carried within the same. By the use of the reflex resistance material bent back upon itself, as shown in Fig. 3, upon both surfaces of the unit, we are able to materially increase the amount of resistance material in circuit and, therefore, the effective resistance of the unit. Further, the resistance material is of a type well adapted to withstand high temperature. By the provision of the reinforcing members for the radial arms, we are able to materially increase the strength of the unit, since these reinforcing arms, connected as they are by the resistance material, serve to provide an exceedingly sturdy structure. Further, by the provision of our improved means of connecting the ends of the radial arms, we are able to very readily connect these arms in place by simply adjusting the members with respect to each other, to inclose the projecting ends of the arms. Further, by our improved construction the conducting parts are effectually insulated from each other so that there is no danger of short circuiting.

Our improved construction may be readily adapted to a wide range of uses, either as a resistance element or as a resistance element adapted for heating purposes and is capable of assuming forms widely different from that shown. It is obvious that if desired the unit may be inclosed at any suitable casing when adapted to these various uses and that, if desired, any suitable terminal connections may be made to the binding posts on the same.

While we have in this application described one specific form which our invention may assume in practice, we do not wish to be limited to this particular form used for purposes of illustration but wish rather to include within the scope of this application all of those forms of our invention falling within its spirit.

What we claim as new and desire to secure by Letters Patent is as follows:—

1. In an electric resistance unit, a reflexed resistance material folded longitudinally to provide for radiation in all directions.

2. In an electric resistance unit, a reflexed resistance material having its adjacent convolutions folded longitudinally and lying in different planes to provide a compact, open construction.

3. In an electric resistance unit, a support and a reflexed resistance material supported thereon at intervals and having its convolutions folded longitudinally upon each other.

4. In an electric resistance unit, a frame and a reflexed resistance material wound thereon and engaging portions thereof, said resistance material including a reflexed wire having its adjacent convolutions folded longitudinally.

5. In an electric resistance unit, a support including a plurality of radial extending arms, means for reinforcing said arms, a hub supporting one end of said arms, means for insulating said arms from said hub, a ring supporting the opposite ends of said arms and a reflexed resistance material wound spirally on opposite sides of said arms and engaging portions thereof.

6. In a support for electric resistance material, a frame, a hub member formed of a plurality of parts, and radial arms carried by said ring and between the parts of said hub member.

7. In a support for electric resistance material, a frame, a threaded sleeve member forming part of a hub, a cap member carried on said sleeve and a plurality of arms extending between said frame and said sleeve.

8. An electric resistance material formed of a reflexed wire folded about a central longitudinal axis.

9. In an electric resistance unit, a circular frame, a central hub having radial openings therein, insulating arms arranged radially with their inner ends received loosely in said openings and their outer ends secured to said frame, and a resistance unit in the form of a spiral supported by said arms.

In witness whereof, we have hereunto subscribed our names in the presence of two witnesses.

OSWALD DALE.
HARRY A. FREDERICK.

Witnesses:
J. D. APGAR,
GEORGE J. MALLON.