C. R. WASSELL.

ELECTRIC HEATING ELEMENT.

APPLICATION FILED MAY 5, 1916.

1,344,282. **Patented June 22, 1920.**

2 SHEETS—SHEET 1.

Fig. 1.

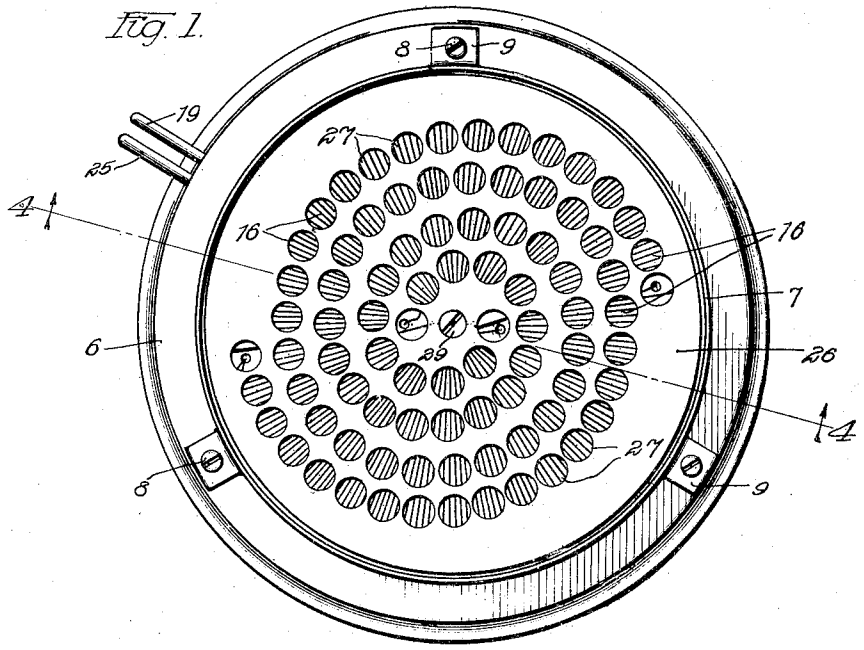
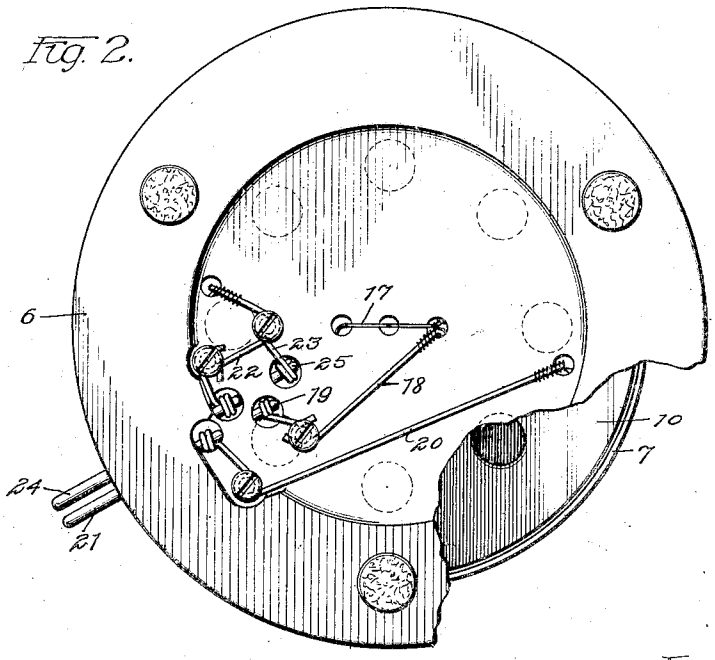


Fig. 2.



Witnesses:
Robert H. Weir
Arthur W. Carlson

Inventor
Clifford R. Wassell
By Brown, Hanson & Boettcher
Attys.

C. R. WASSELL.

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2 SHEETS—SHEET 2.

Fig. 3.

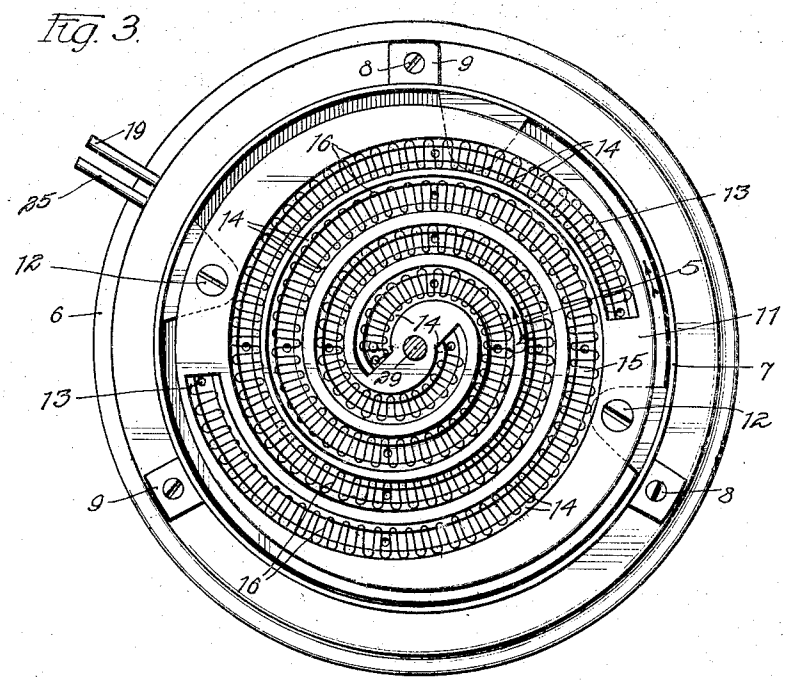


Fig. 4.

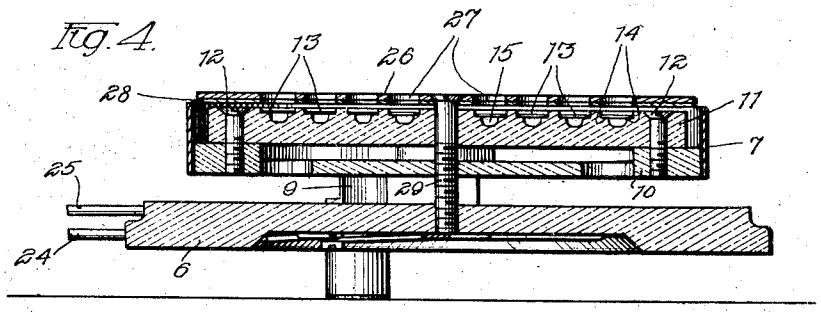
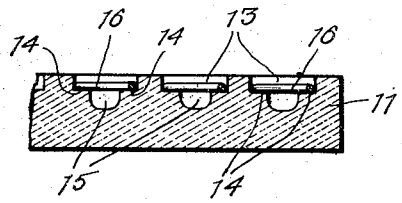


Fig. 5.



Witnesses:

Robert H. Ewin

Arthur W. Carlson

Inventor

Clifford R. Wassell

By Brown, Thomson & Boettcher

Attys.

UNITED STATES PATENT OFFICE.

CLIFFORD R. WASSELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO CONLON ELECTRIC WASHER COMPANY, INC., OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

ELECTRIC HEATING ELEMENT.

1,344,282. Specification of Letters Patent. **Patented June 22, 1920.**

Application filed May 5, 1916. Serial No. 95,544.

To all whom it may concern:

Be it known that I, CLIFFORD R. WASSELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric Heating Elements, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric heating devices and its object is to provide a heating element which will be of greater efficiency and of more simple and inexpensive structure than those of the prior art.

According to my invention, I provide a supporting or carrying member of refractory insulating material, such as fire clay, and I provide in the face of this member a groove, preferably in spiral form, or two parallel grooves in such form, upon the inside of each side of which a supporting shoulder is formed. These shoulders preferably lie in substantially a single plane and the resistance wire, of such material as nichrome or chromel, is prepared in undulated form in substantially a single plane and is laid upon these shoulders, only the edges of the undulated heating element being thus in contact with the carrier.

Thus I produce a definite plane of radiation and the very small contact between the heating element and the carrier reduces loss of heat by conduction to a minimum. The space between the under side of the heating unit and the body of the carrier, which results from this arrangement and structure reduces loss of heat by radiation and accordingly the total efficiency of the device is very greatly increased.

The arrangement which I provide lends itself readily to the use of two resistance units which may be variously connected with the source of current, one alone for medium heat, both in series for low heat, or both in multiple for high heat, all of which will be clear by reference to the accompanying drawings, in which—

Figure 1 is a plan view of my heating device;

Fig. 2 is an under side view thereof;

Fig. 3 is a plan view thereof with the top plate removed;

Fig. 4 is a sectional view taken on the plane of the line 4—4 of Fig. 1 in looking in the direction indicated by the arrows; and

Fig. 5 is a partial sectional view, similar to Fig. 4, drawn on a larger scale.

The base 6, of some suitable refractory electrical insulating material, such as fire clay, has mounted thereon a supporting ring 7, secured in place by means of screws 8—8 passing through the feet 9—9. Secured in any suitable manner within the ring 7 is the secondary supporting member 10, to the top of which the heating element carrying member 11 is secured by means of screws 12—12. The carrying member 11 is of some refractory electrical insulating material, such as fire clay, and the top thereof is provided with a pair of spiral grooves 13—13 in parallel relation to each other, consuming practically the entire area of the top face of the member. These grooves are of uniform cross section, and of the formation illustrated in the cross sectional views, Figs. 4 and 5. It will be seen that each of the grooves is provided upon each side of the interior thereof with a shoulder 14, the grooves being formed considerably deeper than the plane of the shoulders 14—14 to provide the auxiliary depression 15.

A heating element is disposed in each of these grooves and each heating element comprises an undulated resistance wire 16, of some such material as nichrome or chromel, the undulations being disposed in a single plane and the resistance element as a whole being spirally arranged so as to conform to the formation of the groove. As illustrated, the resistance element 16 is laid in the groove, resting upon the shoulders 14—14, which are also disposed in a single plane. It will be noted that only the ends of the undulations, or what may be termed the edges of the resistance element as a whole, are in contact with the carrying member 11, this being made possible by the shoulder formation. In this way I produce a definite plane of radiation wherein the heating element is distributed uniformly over a considerable area. The very small contact between the heating element and the carrier reduces loss of heat by conduction to a minimum. The space below the heating element, provided by the portion 15, is

of importance, since, by this structure and arrangement, loss of heat by radiation is reduced to a minimum.

As will be seen from Fig. 2, the inner ends of the two heating elements are connected together by a jumper wire 17, this jumper wire, by means of a conductor 18, being connected with a terminal member 19. The free end of one of the heating elements is connected by means of a conductor 20 with the terminal member 21 and the free end of the other heating element is connected, by means of conductors 22 and 23, with the terminal members 24 and 25, respectively. The four terminal members are grouped together for coöperation with a separable connector and, by choosing the proper terminal member, the two elements may be connected in circuit in series, or in multiple, or one of the elements may be connected in circuit alone.

A cover plate 26 is disposed over the carrying member 11 with its heating element, this cover plate being provided with two series of holes 27—27 following the course of the two spiral grooves in the carrying member immediately below. A sheet of insulating material 28 is disposed between the under side of the plate 26 and the top of the carrying member 11, this sheet of insulating material being perforated similarly to the plate 26 and having its perforations registering with those in the plate, so that, as illustrated in Fig. 1, the heating elements are practically entirely exposed for effective action upon whatever is set upon the plate 26 to be heated. The sheet of insulating material 28 may be of mica and it is also practicable to secure the desired insulation at this point by properly enameling the under side of the plate 26.

The plate 26 is held in place by means of a screw 29 passing through the member 11 and engaging the member 6, as shown in Fig. 4.

I claim:

1. In an electric heating device, a member of refractory insulating material, said member having a groove therein, opposing shoulders in said groove and a flat heating element having its edges resting upon and thus supported by said shoulders.

2. In an electric heating device, a member of refractory insulating material, said member having a spiral groove therein, opposing shoulders in said groove, and a flat undulated heating element having its edges resting upon and thus supported by said shoulders.

3. In an electric heating device, a member of refractory insulating material, said member having a groove therein, opposing shoulders in said groove, a flat heating element having its edges resting upon and thus supported by said shoulders and a plate covering said member.

4. In an electric heating device, a member of refractory insulating material, said member having a groove therein, opposing shoulders in said groove, a heating element having its edges resting upon said shoulders and a cover plate secured to said member over said groove, said cover plate having a series of holes therein following said groove.

5. In an electric heating device, a member of refractory insulating material, said member having a groove therein, opposing shoulders in said groove, a flat heating element having its edges resting upon and thus supported by said shoulders and a cover plate secured to said member over said groove, there being insulating material between said cover plate and said element.

6. In an electric heating device, a member of refractory insulating material, said member having a groove therein, opposing shoulders in said groove, a heating element having its edges resting upon said shoulders and a cover plate secured to said member over said groove, there being insulating material between said cover plate and said element, said cover plate and said insulating material having a series of holes therein following said groove.

7. In an electric heating device, a base of refractory insulating material, a groove in said member having sunken flat topped shoulders, a flat heating element in the groove supported on said shoulders and held laterally by the walls of the groove, a cover plate secured to said member, said cover plate having a series of holes therethrough following said heating element.

8. In an electric heating device of the character described, a member of refractory insulating material, said member having a groove therein for receiving a heating element, flat shoulders in the groove, the walls above the shoulders being vertical and parallel, and a flat heating element within said groove resting on and supported by said shoulders and held laterally by the walls of the groove.

In witness whereof I hereunto subscribe my name this 29th day of April, A. D. 1916.

CLIFFORD R. WASSELL.