No. 648,481. Patented May 1, 1900.

A. W. BERRESFORD.

ELECTRICAL RESISTANCE.

(Application filed Nov. 9, 1899.)

(No Model.)

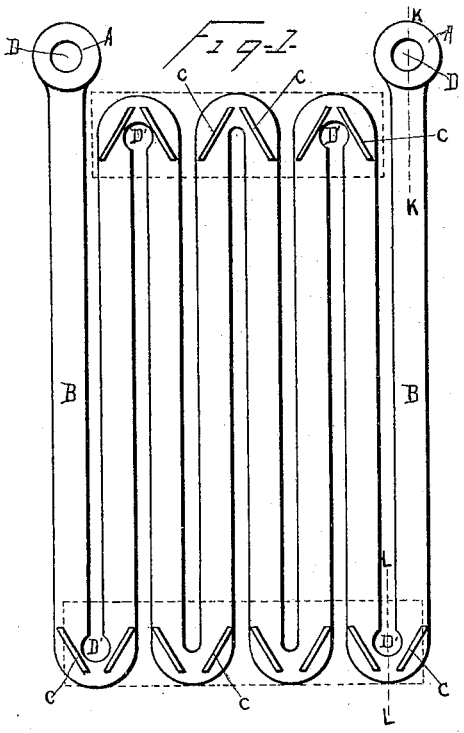

Fig-1.

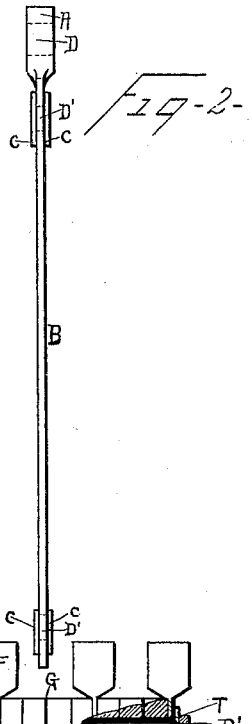

Fig-2.

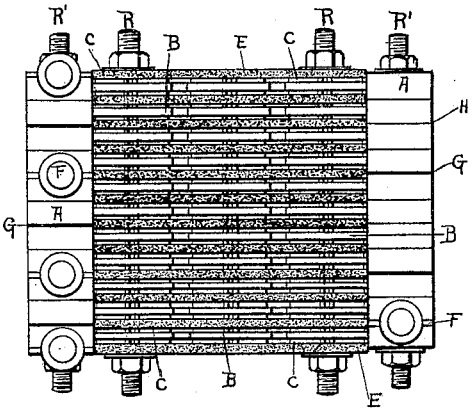

Fig-3.

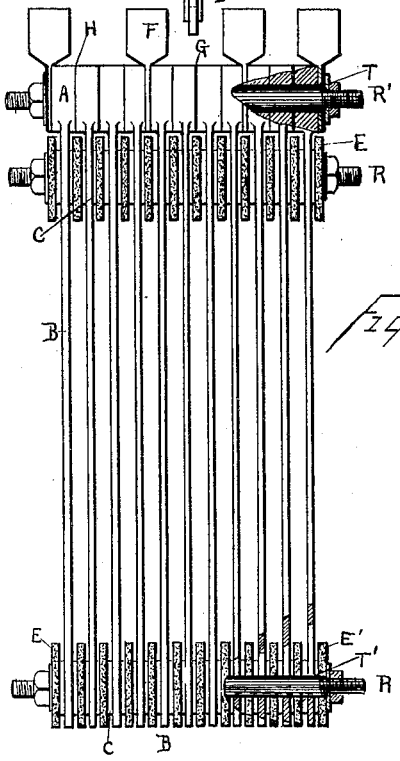

Fig-4.

Witnesses
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UNITED STATES PATENT OFFICE.

ARTHUR W. BERRESFORD, OF WESTFIELD, NEW JERSEY.

ELECTRICAL RESISTANCE.

SPECIFICATION forming part of Letters Patent No. 648,481, dated May 1, 1900.

Application filed November 9, 1899. Serial No. 736,446. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR W. BERRESFORD, a citizen of the United States of America, and a resident of Westfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Electrical Resistances, of which the following is a specification.

My invention relates to that class of electrical resistances which are made up of conducting elements generally known as "grids," and relates to a method of forming and assembling said elements so that the resultant structure shall be extremely rigid and well adapted to withstand mechanical injury, even though the component elements be fragile or easily subject to distortion. At the same time I provide for free access of air to all parts of the structure, while effectually preventing accidental electrical contact of parts in close proximity, and so arrange the whole as to use a minimum amount of insulating material.

In the accompanying drawings, Figure 1 represents a plan view of a type of grid which I employ, and Fig. 2 represents an edgewise view of the same, while Figs. 3 and 4 represent a plurality of grids of this type assembled or banked together, Fig. 3 being a top view of the bank and Fig. 4 an edgewise view, Fig. 4 being cut away on the lines K K and L L of Fig. 1 to show in detail the method of assembling.

Similar parts in all instances are designated by similar letters.

Reference to Figs. 1 and 2 will make evident that the element or grid as shown consists of a folded or "reflexed" metallic conductor B, preferably of thin rectangular section, so as to obtain the greatest amount of cooling-surface for a given resistance and weight of metal. This conductor is terminated at either end by a lug of heavier section A, which is traversed by a hole D, through which may be passed an assembling-rod, while enlargement of the slots, as shown at D', permits the passage of further assembling-rods. There are also provided, as shown at C, lateral projections above the general surface of the grid of elongated rectangular form. The method of banking preferably employed consists in arranging a number of these elements one above the other in such relation that the holes D D' in each grid shall register, but separating them from metallic contact by means of the insulating-pieces E and E', as shown in Figs. 3 and 4. These insulating-pieces are of rectangular form, as indicated in the dotted outlines on Fig. 1, and are provided with holes which register with the holes D'. It will be noted from Fig. 1 that the upper insulating-piece E does not extend sufficiently far to engage the exterior legs of the grid. The grids being arranged as above stated, insulating-tubes are passed through the holes D', as shown at T' in Fig. 4, and through these tubes rods are passed threaded at either end and fitted with suitable nuts and washers, and by means of these nuts the body of the bank is drawn into a rigid whole. The desired electrical arrangements of the grids as to series or parallel grouping is now made by allowing the lugs A to come into contact where so necessary, as at H, Figs. 3 and 4, and separating them by suitable insulators G where such are needful, and exterior connections are made by inserting a current-carrying lug, as at F, Figs. 3 and 4. Insulating-tubes T, Fig. 4, are now passed through the holes D, and these again are traversed by rods R', threaded at the ends and provided with nuts, &c., or other similar device, and by means of these nuts the terminal lugs are drawn tightly together.

It is obvious that the insertion of the lugs F and insulating-pieces G causes a considerable displacement of the exterior legs of the grid, and if these were engaged by the insulating-piece E while attempt was being made to clamp the bank together danger of breakage might result.

The function of the projecting pieces C is twofold: In order that each portion of each grid my receive sufficient ventilation, it is necessary that they be separated from each other, and if this distance is made sufficiently great to insure complete passage of air and the space between consecutive grids be entirely taken up by the insulating-pieces E E', as would be necessary in drawing the elements into a rigid whole, then would the insulating-pieces E E' be unnecessarily thick and expensive; but the projecting pieces C take up a portion of this space and are so pro-

portioned to the height of the lugs A as to allow for a minimum working thickness of the insulating-pieces E E', and at the same time the insulating-pieces are held clear of the surface of the grid and free air circulation is insured.

It is obvious that the above method of construction produces a resistance-bank which though made up of elements in themselves fragile is a self-contained, strong, and rigid construction and capable of withstanding any ordinary handling or abuse—as, for instance, in shipment from one place to another—and at the same time lends itself readily to various methods of support. For instance, I might extend the banking or assembling rods until they engage a properly-constructed framework, or I might attach lugs to the bank of grids by means of these rods and hang them to a framework, or I might fasten legs to the rods, so that the bank shall be self-contained. It is also obvious that slight changes might be made in the method of construction, as indicated, but which changes are evidently covered by the spirit of my invention. For instance, the pieces E E' need not be provided with holes nor be in the line of the banking-rods, nor is it absolutely essential that the pieces C shall be at the bends or angles of the grid, and their form may be otherwise than as indicated—for instance, a row of raised projecting points. The holes D' need not be at the end of the slots, but might pass through the body of the grid. Also the rod of the clamping device might pass entirely exterior to the grids and not through holes therein.

I am aware that cast-metal grids have been heretofore employed as electrical resistance, and do not therefore claim this as a feature of my invention; but

What I do claim, and in which I desire to secure the protection of Letters Patent, is—

1. In combination, a plurality of cast-metal forms or grids so separated from metallic contact by insulating-pieces as to permit free access of air to the surface of said grids, and made into a rigid structure by suitable clamping devices, substantially as described.

2. An electrical resistance composed of a plurality of conducting-grids, said grids being so separated from metallic contact by insulating-pieces as to permit free access of air to surface of said grids, and drawn into a rigid structure by rods passed through holes in said grids, substantially as described.

3. An electrical resistance composed of a plurality of conducting-grids, said grids being so separated from metallic contact by insulating-pieces as to permit free access of air to surface of said grids, and drawn into a rigid construction by rods passed through holes in said grids, and in said insulating-pieces, substantially as described.

4. In an electrical resistance the combination of a plurality of conducting-grids, separated from each other by insulating-pieces, and lateral projections upon the surfaces of said grids bearing upon the separating-pieces substantially as and for the purpose described.

5. In an electrical resistance the combination of a plurality of conducting-grids so separated by insulating-pieces as to permit free access of air to surface of said grids, said insulating-pieces being so arranged as to leave the external legs free, and means for drawing the whole into a rigid structure, substantially as described.

6. A cast-metal resistance form or grid provided with laterally-projecting terminal lugs, holes in said terminal lugs and other holes formed in the slots traversing the grid, and lateral projecting portions formed on the surface of said grid substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature, this 4th day of November, 1899, in the presence of two witnesses.

ARTHUR W. BERRESFORD.

Witnesses:

OTTO ROTHENSTEIN,

FRANK HOSKINS.