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RESISTANCE FOR ELECTRIC HEATERS.

APPLICATION FILED JAN. 31, 1914.

1,139,076. Patented May 11, 1915.

Fig. 1.

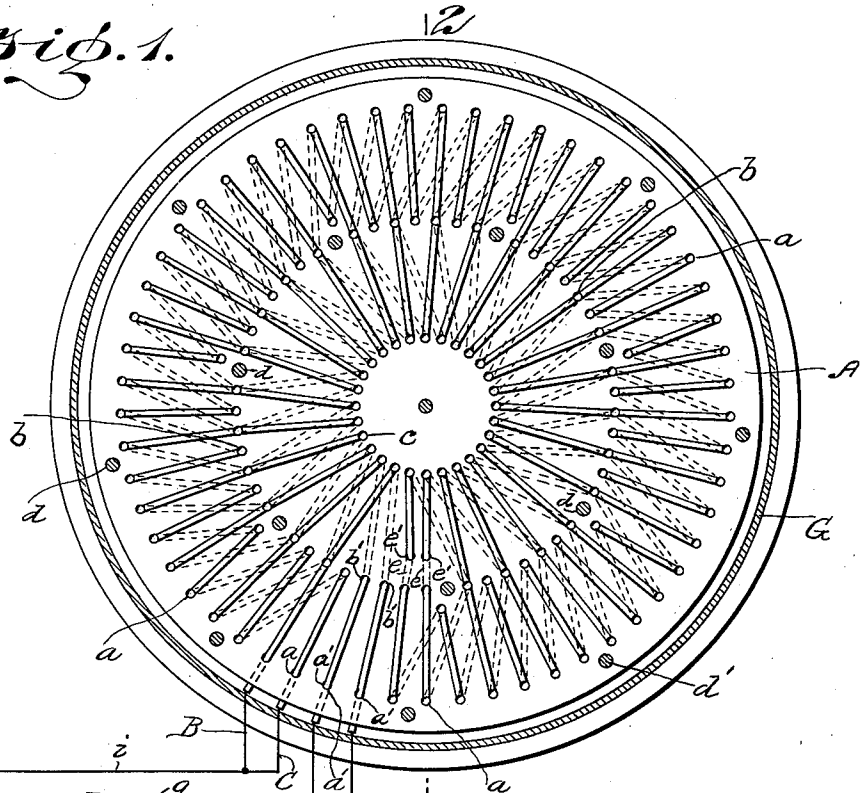
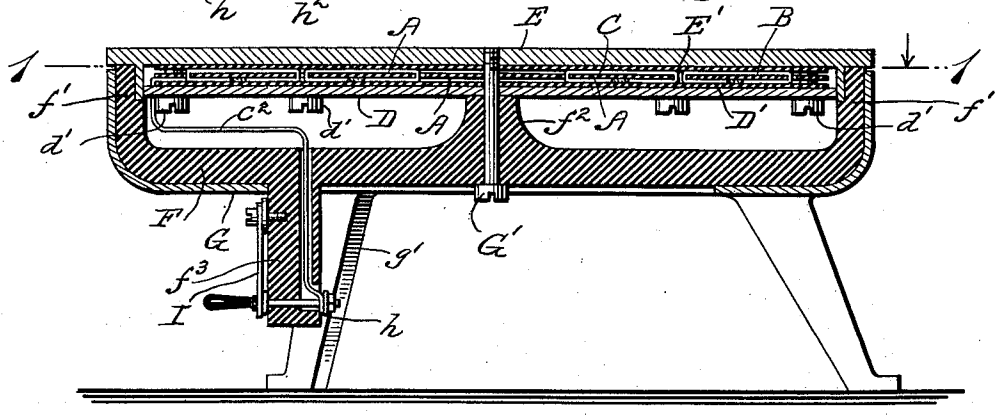


Fig. 2.



WITNESSES

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RESISTANCE FOR ELECTRIC HEATERS.

1,139,076. Specification of Letters Patent. Patented May 11, 1915.

Application filed January 31, 1914. Serial No. 815,851.

To all whom it may concern:

Be it known that I, EDWIN A. RUTENBER, a citizen of the United States, residing at Logansport, county of Cass, and State of Indiana, have invented a certain new and useful Resistance for Electric Heaters, of which the following is a specification.

This invention is an electrical resistance for use, mainly, in electric heaters, although it is to be understood that said resistance is capable of other uses, or of use in other relations.

The object of the invention is to secure different heating effects in one and the same structure, and to distribute the heat, developed by the flow of electrical current, uniformly over the area of a metallic mass, such uniformity of distribution being obtainable at high, low or intermediate heats.

A salient feature of the invention is a single insulating member or core which is common to a plurality of resistance coils whereby said single core coöperates with said plurality of coils for retaining them permanently in a predetermined relation and against possibility of a relative displacement of said coils, which displacement is likely to result in a short circuit. In a preferred form, the core is a single flat disk, usually composed of a thin piece of mica, provided with a plurality of circular rows of apertures, and a plurality of resistance ribbons or wires laced through said apertures in such a way as to produce two flat coils. The wires composing one coil are laced through the first and second circular rows of apertures so that the several windings of the two coils will alternate with each other and said windings are positioned against the respective faces of the core. The wires are then laced through the second and third circular rows of apertures in a similar manner, said wires being drawn taut against and folded around the edges of the apertures in the second circular row so that the outer windings and the inner windings, both of which are laced partly through the second circular row of apertures will not touch. The result of lacing the wires in the manner described is to produce two flat coils, each of which coils is laced to produce a winding at the edge of the disk and, also, a winding nearer to the center of the disk, said windings being concentric. It is to be understood that two wires or ribbons are employed, and that they are laced to produce inner and outer windings, the wires being parallel. It is apparent that the wires or ribbons are distributed over the surfaces of the single core in a manner to secure a distribution of the heat uniformly over the surface of the metallic mass within which the resistance is incased.

A practical advantage secured by this invention is that the windings of the two wires or ribbons are retained permanently in fixed and immovable relation by the apertured disk composing the insulating core, so that the wires cannot become displaced relatively to each other during the installation of the resistance within the metallic mass, or from other causes.

Other features and advantages of the invention will appear in the course of the following detailed description.

In the drawings, Figure 1 is a horizontal section on the line 1—1 of Fig. 2 showing in plan the resistance embodying this invention, and Fig. 2 is a vertical section on the line 2—2 of Fig. 1, illustrating the resistance in an operative position within one form of an electric heater.

A designates the core and B C the wires or ribbons comprising the resistance of this invention. Said core A is composed of a single flat piece of suitable insulating material, such as mica; the core is, preferably, in the form of a disk, although it is obvious that the shape is not material. The core is provided with a plurality of circular rows of apertures *a*, *b*, *c*, and near its edge with bolt or rivet holes *d*, the circular rows of said apertures *a*, *b*, *c*, being concentric to each other.

The wires B C are of different electrical resistances, and they are laced through the apertures *a*, *b*, *c*, to produce a plurality of flat windings. As shown in the preferred embodiment of the invention, the wires are both passed through adjacent apertures *a* in the first circular row, and carried across one face of the core to, and passed through, adjacent apertures *b* in the second circular row; thence they are carried in a reverse direction and across the other face of the core to and laced through the next two apertures *a* in the first circular row, and so on alternately through adjacent apertures in the first and second rows *a b* until the wires are laced into all said apertures of the first and second rows, thus resulting in the production of two windings the wires or rib-

bons of which are parallel and are positioned partly against one face of the core and partly against the other face thereof, the said windings of the two wires being next to the outer edge of the core. After lacing the wires or ribbons through the first and second rows of apertures, during which time the wires are drawn tightly against the edges of the apertures so as to flatten the wires against the respective faces of the core; the two parallel wires are then extended for a short distance as at *e* in Fig. 1 and are laced through apertures *e'*, thence the wires are carried across one face of the core to and through two adjacent apertures *c* in the third circular row; thence they run across one face of the core and are laced through two adjacent apertures *b* in the second row, the wires being drawn taut so that they will not contact with the wires of the first windings previously laced through said apertures *b* of the second row; thence the wires are carried across the opposite face of the core and are passed through the next two apertures *c* of the third row, and so on until the wires are laced through substantially all the apertures *b c* of the second and third rows. The ends of said wires B C are now passed through apertures *b' b'* and *a' a'* in the second and first rows, respectively. As shown, the ingoing ends of wires B C are joined to conductors b^2 c^2 which are in connection with switch terminals *f g* respectively, it being preferred to employ a third switch terminal *h* which is branched at *h'* h^2 to the conductors c^2 b^2. The other ends of resistance wires B C are joined to a common return conductor *i*.

It will be noted that the two resistance wires B C are wound in parallel order through apertures *a b* to produce two coils near the outer edge of the core, and thereafter to produce two other coils nearer to the center of the core, the first and second windings being concentric, although this concentric relationship is not material or important. Furthermore, the wires composing the windings are disposed partly on one surface and partly on the opposite surface of the core.

It should be stated that the wires or ribbons are preferably of different electrical resistances, and that it is preferred to use wire of a flat cross section in the construction, the wire being practically a ribbon.

In Fig. 2 of the drawings the resistance is shown in operative position within one form of a heater. The core A having the windings B C thereon is positioned within a metallic mass, the latter embodying, in the form shown, two plates D E. The exposed or bare metal windings of the resistance ribbons B C are insulated from electrical contact with the plates D E of the metallic mass by interposed layers of resistance material D' E'. It is to be understood that the core with the windings thereon are placed between the insulating layers D' E' and the whole positioned between the plates D E, after which the several parts are clamped or bound firmly together by screws *d'*, the latter passing through the apertures *d* of the core A and through corresponding apertures in the insulations D' E' and the plates D E respectively.

The metallic mass with the interposed resistance are supported on a suitable base F composed of insulating material, said base being shown as having an upstanding flange *f'* and a central boss f^2. The base F is supported within a suitable framework G shown as having depending legs *g'*, but, of course, the means for supporting the resistance and the metallic mass may be modified or varied as desired. The plates D E are positioned upon the upstanding flange and boss of the base, and the parts are retained fixedly in position by a bolt G', the latter passing through the boss f^2, the metallic plates and the resistance core.

The conductors b^2 c^2 extend for a suitable distance outside the core A of the resistance and the switch contacts *f g h* are supported on a depending part f^3 of the base F. A suitable switch I is positioned to sweep across these contacts for controlling the flow of current into the resistance wires B C, so as to provide for varying heats. said windings being so arranged relative to the metallic masses that the heat will be distributed uniformly for practically the full area of the metallic mass.

By employing a core composed of a single piece of material and winding the resistance wires or ribbons on said core in the manner described, I am enabled to retain all the windings in fixed or predetermined relation, thus precluding the possibility of displacing the windings when clamping the core and the windings between the plates composing the metallic mass.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent is:

1. An electrical resistance embodying a core composed of a single layer of mica provided with a plurality of rows of apertures, and a plurality of resistance wires or ribbons laced through said apertures, and producing flattened windings in contact with the respective faces of said core, the inner and outer windings being passed through the same apertures of two adjacent rows and all of said windings being retained immovably in position by said core.

2. An electrical resistance comprising a core composed of a single piece of insulating material and provided with concentric rows of apertures, and a plurality of re-

sistance wires laced through said apertures and producing windings which are in contact with the respective surfaces of the core, the inner and outer windings being laced through the same apertures forming the middle row of apertures in the core.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN A. RUTENBER.

Witnesses:
ETHYL MOORE,
JAMES E. DE LONG.