F. W. GORE.

ELECTRICAL RESISTANCE.

APPLICATION FILED DEC. 23, 1910.

1,112,788.

Patented Oct. 6, 1914.

3 SHEETS—SHEET 1.

Fig. 2.

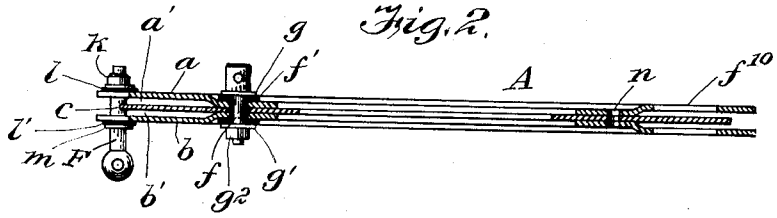


Fig. 1.

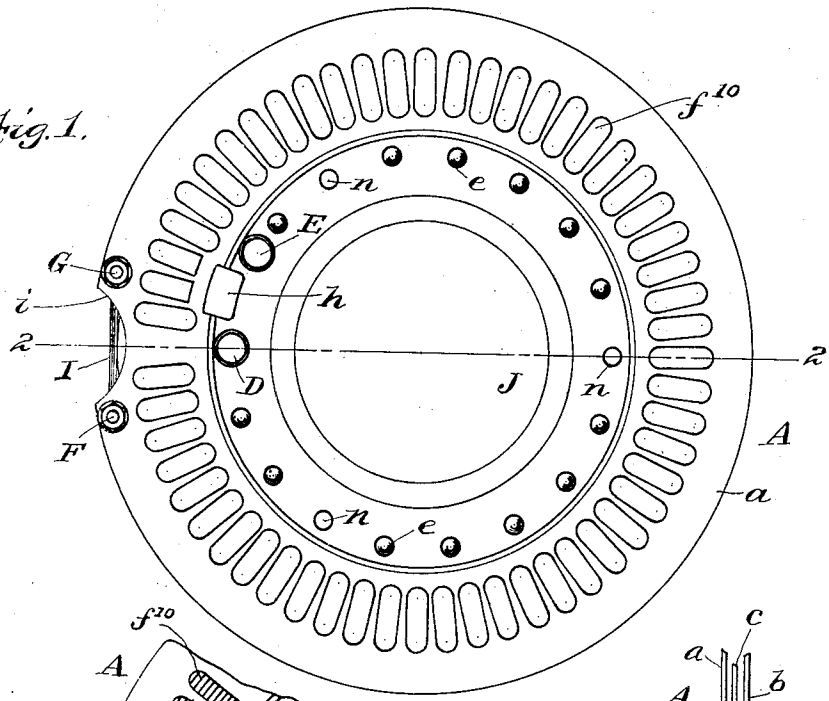


Fig. 3.

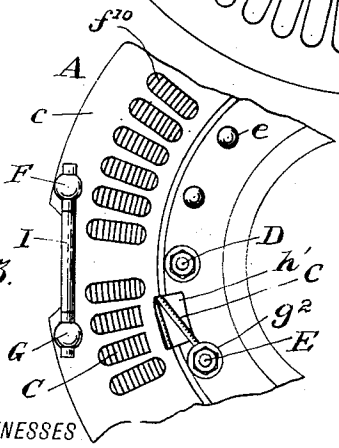
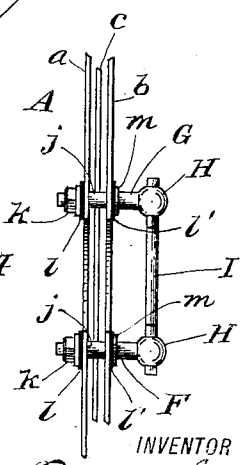


Fig. 4



WITNESSES

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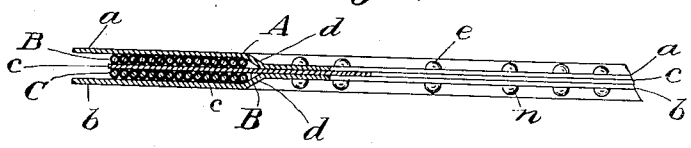
3 SHEETS—SHEET 2.

Fig. 5.



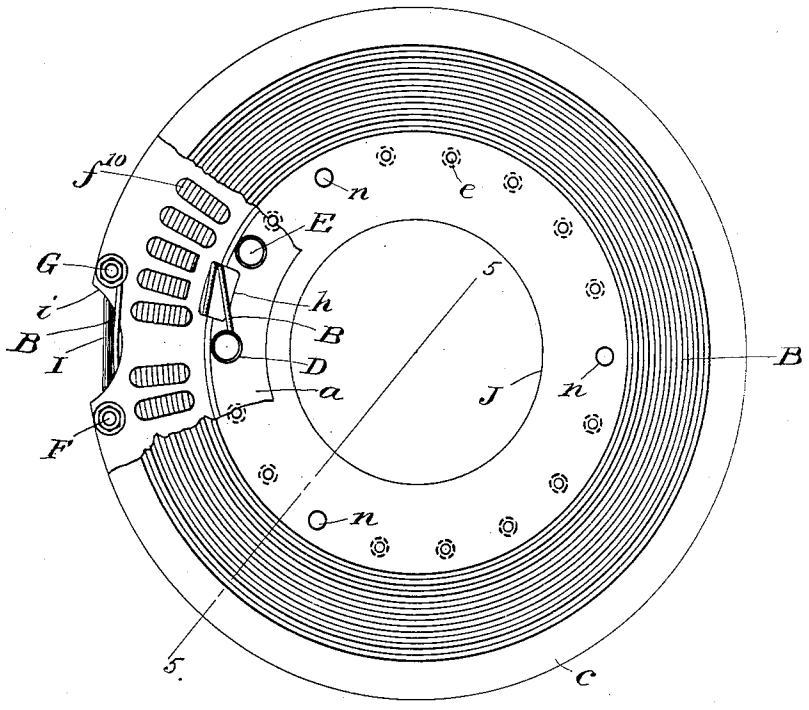


Fig. 6.

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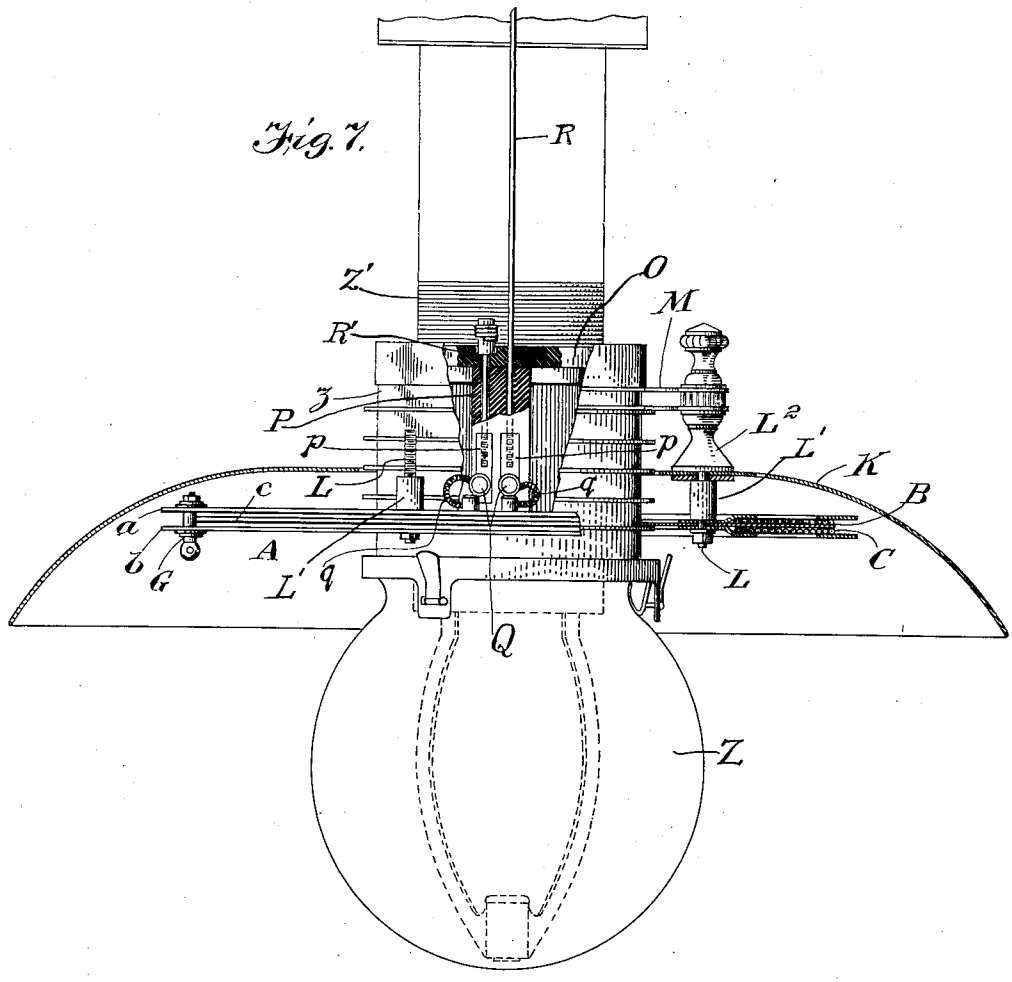
3 SHEETS—SHEET 3.

Fig. 7.



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ELECTRICAL RESISTANCE.

1,112,788. Specification of Letters Patent. Patented Oct. 6, 1914.

Application filed December 23, 1910. Serial No. 598,975.

To all whom it may concern:

Be it known that I, FREDERICK W. GORE, a citizen of the United States, residing in the city of New York, borough of Brooklyn, county and State of New York, have invented a certain new and useful Electrical Resistance, of which the following is a specification.

This invention is an electrical resistance, the same being adapted for use generally in the electrical art, although in one specific adaptation of the invention it is employed in connection with arc lamps.

The objects in view are, first, to rapidly radiate and dissipate the heat evolved by the flow of current through the resistance winding; second, to secure a compact organization of the winding; third, to provide for the easy replacement of a fuse should an excess of current be supplied to the resistance, and, finally, to simplify the construction and secure economy in manufacture.

The resistance of this invention embodies several distinct features of novelty, one of which is a spool or bobbin adapted to contain a plurality of windings, said windings being mechanically separated by a part or member of the spool or bobbin.

In a preferred form, the spool or bobbin comprises a plurality of members, three in number, two of said members being deflected at the middle parts thereof, and the third member being positioned intermediate the two said members so that all the members are adapted to be united rigidly together, whereby the edge portions of the outer members are adapted to be spaced relative to the edge portion of the interposed member, in which spaces the windings are adapted to be coiled separately, thus disposing the windings in compact relation to the members and mechanically separating the windings by the interposed member.

The invention embodies, also, means in cooperative relation to the plurality of windings for supporting a fuse in circuit therewith, said fuse being supported in a position easily accessible for replacement in case it is burned out by an excess current admitted to the resistance windings.

The invention embodies, further, means for supporting the resistance in a position externally to an electric arc lamp, preferably within or below a reflecting hood, said hood and the resistance being attached by the suspension devices to the lamp.

Other features of the invention will be hereinafter described in the course of the following detailed description.

In the accompanying drawings I have illustrated one practical embodiment of the invention, but the construction shown therein is to be understood as illustrative only, and not as defining the limits of the invention.

Figure 1 is a plan view of an electrical resistance embodying my invention. Fig. 2 is a vertical section on the line 2—2 of Fig. 1, the resistance windings being omitted for the sake of clearness. Fig. 3 is an inverted or bottom plan view of a portion of the resistance illustrating a fuse adapted to be positioned between the windings of the resistance coil. Fig. 4 is an edge view of the parts shown in Fig. 3. Fig. 5 is a vertical section, on an enlarged scale, of a part of the spool or bobbin with the plurality of resistance windings thereon, the plane of section being indicated by dotted line 5—5 of Fig. 6. Fig. 6 is a plan view with the upper plate or member partly broken away and illustrating one of the plurality of windings on the spool or bobbin. Fig. 7 is an elevation partly in section illustrating my resistance applied to an arc lamp.

In carrying the invention into practice a spool or bobbin, indicated in its entirety by A, is employed for the reception of a plurality of windings or resistance coils. The spool or bobbin consists of a plurality of members, *a*, *b*, *c*, preferably in the form of plates to produce a compact construction. Plates, *a*, *b*, are depressed at their middle portions, as at *d*, and plate, *c*, is positioned intermediate plates, *a*, *b*. Plates, *a*, *b*, are assembled so that their depressed portions, *d*, are reversed, and when said dished plates, *a*, *b*, and plate, *c*, are assembled as shown in Figs. 2 and 5, spaces, *a'*, *b'*, are provided between the edge portions of plate, *c*, and dished plates, *a*, *b*, respectively. The dished portions of plates, *a*, *b*, and plate, *c*, are united firmly by any suitable means, such as rivets, *e*.

It will be noted that plates, *a*, *b*, *c*, are disposed in close relation, resulting in a compact construction of the spool or bobbin. The plates, *a*, *b*, have comparatively large areas exposed to the circulation of air for the purpose of radiating the heat developed by the flow of the current through the resistance coils. To increase the radiating

effect of the resistance device, plates *a*, *b*, are provided with slots or openings, f^{10}, through which air may flow, or the heat from the coils may be radiated. Said plates, *a*, *b*, *c*, composing the spool or bobbin may be of any desired material or combination of materials. For example, I may employ plates composed of copper, aluminum, brass or other metal, or the plates may be composed of pressed asbestos boards, or a combination of metal plates and asbestos boards may be used according to requirements.

B and C designate the resistance coils or windings each composed of insulated wire, one winding, B, occcupying the space, *a'*, between plates, *a*, *c*, and the other winding, C, occupying the space between plates, *b*, *c*, as shown clearly in Fig. 5.

The connecting wires from an apparatus, such as an arc lamp shown in Fig. 7, are attached to binding posts, D, E, respectively, each binding post being provided with a shank, *f*, which passes through an insulating bushing, *f'*, the latter being positioned in plates, *a*, *b*, *c*, adjacent the dished portions, *d*, for the purpose of thoroughly insulating the binding post from the metal composing the spool or bobbin. As shown more clearly in Fig. 2, each binding post is provided with washers, *g*, *g'*, and the lower end of the shank, *f*, is threaded for the reception of a nut, g^2, whereby the binding post is adapted to be held in a fixed position on the spool or bobbin. One end of winding, B, is attached to binding post, D, and from thence it passes through a slot or opening, *h*, which is provided in plate, *a*, of the spool or bobbin, after which the coil, B, is wound clockwise upon the depressed portion, *d*, of plate, *a*, and between plates, *a*, *c*, and finally the other end of the wire composing coil, B, is securely attached to a post, G.

The other resistance coil, C, is attached at one end to binding post, E, by means of the nut, g^2, thereof, as shown in Fig. 3; from said post, E, the wire passes through a slot, *h'*, provided in the lower plate, *c*, of the spool or bobbin; thence the coil is wound upon the depressed portion, *d*, of plate, *c*, and in the space, *b'*, between plates, *b*, *c*, and finally the other end of the wire composing the said coil, C, is attached to binding post, F.

Each coil is wound clock-wise upon the spool, but coil, C, is wound in a reversed direction to coil, B; in other words, coil, B, is wound right handed, as shown in Fig. 6, and coil, C, is wound left handed, as shown in Fig. 3.

Binding posts, *f*, *g*, are attached to plates, *a*, *b*, of the spool near the outer edge thereof and adjacent cut away portion, *i*, in the edges of said plate, *a*, *b*, (see Figs. 3 and 6). Each binding post passes through a bushing, *j*, composed of insulating material, and at their upper ends said binding posts are provided with nuts, *k*, adapted to rest upon washers, *l*, composed of mica or other insulating material. The posts are provided with shoulders, *m*, adapted for engagement with washers, *l'*, composed of insulating material, said shoulders, *m*, and washers, *l'*, coöperating with lower plate, *b*, of the bobbin whereas the washers, *l*, and nuts, *k*, coöperate with upper plate, *a*, of the bobbin. It will be seen that each binding post is fixedly secured to the bobbin, and is effectively insulated therefrom. Said binding posts, F, G, are connected with coils, B, C, respectively, and the posts are provided with devices, H, adapted to support a fuse, I, in series with resistance coils, C, B, all as clearly shown in Fig. 4.

From the foregoing description taken in connection with the drawings it will be understood that a wire leading from the apparatus with which the resistance is to be used is connected to binding post, D, and to this post is attached one end of the wire composing resistance coil, B, the other end of said wire forming the resistance coil, B, being attached to binding post, F. One end of the wire composing resistance coil, C, is attached to binding post, F, after which the resistance coil is wound between plates, *b*, *c*, and thence extends to binding post, E, from which post a wire leads to the apparatus with which the resistance is to be used. The current enters at post, D, flows through insulated wire of coil, B, thence through post, G, across the fuse, I, thence through post, F, thence through coil, C, and from post, E, to the apparatus. The fuse, D, is in series with the resistance coils, and should an excessive current be admitted to the resistance, said fuse will blow out, thus interrupting the circuit and preclude substantial injury of the resistance coils. The fuse is supported in a position at the edge of the spool or bobbin so that an operator is able to obtain easy access to the fuse supporting devices, H, of binding posts, F, G, whereby a new fuse can be easily placed in position.

The resistance of this invention is adapted by its compact construction and high radiating efficiency to be used in different kinds of electrical apparatus, but in Fig. 7 of the drawings I have shown said resistance in operative relation to an arc lamp, Z, some of the working parts of which are inclosed within a casing, *z*. The spool or bobbin, A, of the resistance is provided with a central opening, J, which enables the resistance device to be fitted around casing, *z*, of the lamp externally to said lamp, said resistance spool or bobbin being positioned substantially out of contact with the casing of the lamp. The lamp is provided with a hood, K, and resistance, A, is positioned within said hood. The hood and the resist-

ance are supported on the lamp by suspension bolts, L. The plates, *a*, *b*, *c*, composing the bobbin are provided with apertures, *n*, through which are adapted to pass suspension bolts, L, said bolts having shoulders, L′, for spacing the resistance relatively to the hood. The bolts, L, pass upwardly through openings in the hood, and said bolts fitted to a supporting ring or band M attached externally to the lamp casing, *z*. The ring or band supports bolts, L, which bolts in turn support hood, K, and resistance, A, spacing device, L^2, being provided between the hood and supporting ring.

In some cases the hood, K, serves as a reflector for the light from the arc lamp, and for this purpose the under surface of the hood may be polished or provided with any suitable kind of reflecting surface. When metal is employed in the construction of the resistance spool or bobbin, the lower plate, *c*, thereof is polished so as to serve as a reflecting surface.

It will be observed that the hood and the reflector are supported securely in position above the globe of the lamp, and that the resistance is positioned in spaced relation to the hood, and within the under side thereof, whereby air is free to circulate around the resistance so as to carry off the heat radiated from the metallic plates thereof. The resistance is fully exposed so as to radiate the heat and be protected from the weather by the hood. The fuse of the resistance is easily accessible to the operator in order to replace a burned out fuse.

As shown in Fig. 7, the arc lamp is provided with a member, O, composed preferably of porcelain, and with a block, P, the latter being composed of asbestos, or the like. The block is shown as having metallic plates, *p*, embedded therein, and these plates are in electrical engagement with binding posts, Q. The member, O, and block, P, are provided with vertical openings, through which extend screws, R, R′, the lower ends of said screws being in electrical contact with metal plates, *p*, respectively. The binding posts, Q, are connected by conductors, *q*, to posts, E, D, of the resistance. One conductor, R, leads the current to the resistance, while conductor, R′, is connected to solenoid winding, Z′, of the lamp.

It has been stated that coils, B, and, C, are wound on the bobbin reversely to each other. This is a preferred construction, for several reasons, and chiefly because the respective ends of the two coils are positioned for attachment to the respective parts of binding posts, D, G, and E, F, and, also, for the reason that the coils may be wound expeditiously by the aid of machinery. When winding coil, B, the bobbin is positioned in the machine, such as a chuck, one end of wire, B, is attached to post, D, the chuck and spool are revolved so as to wind the coil between members, *a*, *c*, and the end of the wire then attached to post, G. Prior to winding coil, C, one end is attached to post, E, and then the chuck and bobbin are rotated in an opposite direction so as to wind the coil between members, *b*, *c*, after which the end of the wire is attached to post, F. This construction and mode of procedure enables me to wind the coils quickly and accurately upon the spool, and to secure the ends of the coils to the posts on the spool so that the fuse, I, can be brought into operative relation to the coils, so that said fuse can be replaced when desired.

The resistance is exceedingly compact in construction, each coil being composed of a single layer of wire wound clockwise between two of the members entering into the construction of the bobbin. The coils are positioned into contact with heat radiating plates which are slotted or perforated for ventilating purposes, thus resulting in rapid dissipation of the heat.

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

1. In an electrical resistance, a spool or bobbin, resistance coils wound clockwise thereon and in reverse directions to each other, and means for separating the windings of said coils.

2. In an electrical resistance, a spool provided with a separating member providing intermediate spaces adapted for the reception of resistance coils, one of said resistance coils occupying each of said spaces at the respective sides of the separating member, said resistance coils being wound clockwise in reverse directions to each other.

3. In an electrical resistance, a unitary spool embodying a separating member the respective faces of which are parallel, and a plurality of other members positioned in contact with the respective surfaces of the separating member, said members being fastened together and the edge portions of the second named members being deflected laterally with respect to the surfaces of the separating member, to form individual coil-receiving spaces, in combination with separate coils wound within said spaces and mechanically separated from contact with each other by the marginal portion of the separating member.

4. In an electrical resistance, a unitary spool embodying a separating member and a plurality of other members positioned in contact with the respective surfaces of, and attached rigidly to, said separating member, said second named members having their marginal portions deflected away from the separating member, combined with resist-

ance coils wound upon the deflected marginal portions of the second named members, said coils being mechanically separated from contact with each other by the marginal portion of the separating member.

5. In an electrical resistance, a plurality of dished plates and a third plate interposed between the dished plates and united thereto into a unitary spool, and a plurality of resistance coils wound on the spool between the dished and interposed plates, said coils being mechanically separated by the interposed plate.

6. In an electrical resistance, a spool comprising a plurality of perforated members and a separating plate intermediate the perforated plates, and a plurality of coils wound in spaces between said perforated and separating plates.

7. In an electrical resistance, a spool embodying a plurality of dished members positioned reversely to each other and a separating member interposed between, and attached to, said dished members, combined with a plurality of separate coils wound upon the dished portions of the first named members and separated from mechanical contact with each other by the separating member, said first named members being provided in the dished portions thereof with air circulating openings.

8. In an electrical resistance, an open center spool embodying a plurality of annular dished members positioned reversely to each other and an annular separating member interposed between the dished members and united thereto, each member being provided with a central opening in register with similar openings of the other members, combined with separate coils wound upon the dished portions of the respective dished members and separated from mechanical contact with each other by the marginal portion of the separating member.

9. In an electrical resistance, the combination of a spool provided with separate peripheral coil-receiving spaces, a plurality of binding posts secured to said spool and positioned therein at one side of said spaces, a plurality of separate coils wound clockwise upon the spool and within the peripheral spaces thereof, said coils being wound reversely to each other and each having one end attached to one of said posts, and other fuse-supporting posts secured to the peripheral part of the spool, said coils having their other ends fastened to said fuse-supporting posts.

10. In an electrical resistance, the combination of a spool provided with separate peripheral coil-receiving spaces, a plurality of binding posts positioned on the spool, a plurality of other fuse-supporting posts secured to the peripheral part of the spool and exposed thereon for convenient access, and separate coils wound on the spool and within said peripheral spaces thereof, each coil having an inner end portion attached to one of said first named binding posts and having an outer end portion secured to one of said fuse-supporting posts.

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

FREDERICK W. GORE.

Witnesses:
H. I. BERNHARD,
J. F. MOTHERSHEAD.