H. HERTZBERG & M. J. WOHL.

RHEOSTAT.

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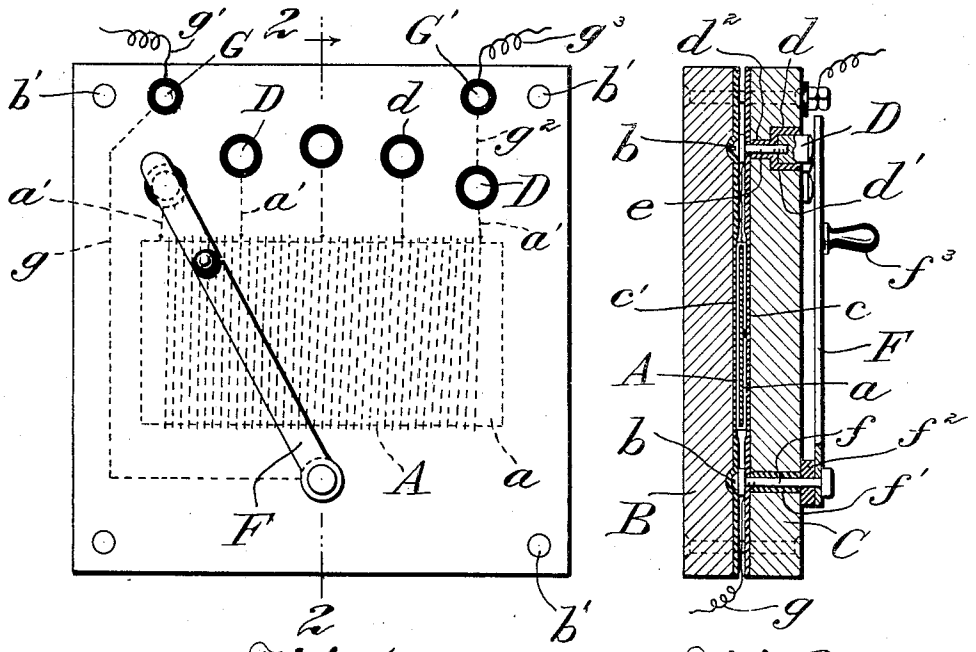

Fig. 1. Fig. 2.

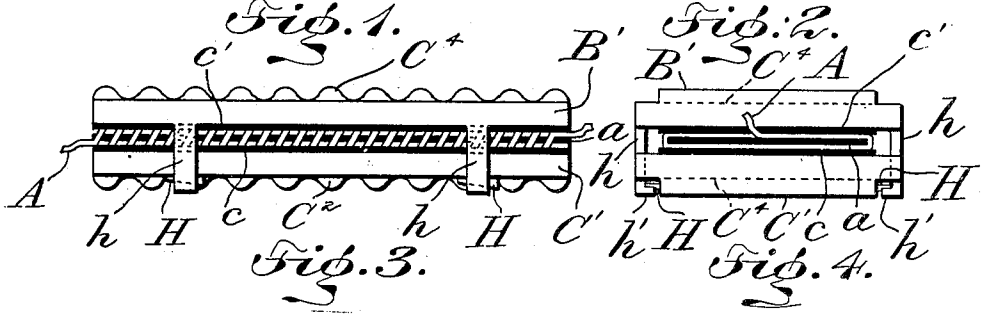

Fig. 3. Fig. 4.

WITNESSES

H. C. Abbott

V. E. Nichola

INVENTORS

Harry Hertzberg and
Maurice J. Wohl

BY

Griffin & Brumbaugh

ATTORNEYS

UNITED STATES PATENT OFFICE.

HARRY HERTZBERG AND MAURICE J. WOHL, OF NEW YORK, N. Y., ASSIGNORS TO ECONOMY ELECTRIC COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

RHEOSTAT.

965,299. Specification of Letters Patent. Patented July 26, 1910.

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To all whom it may concern:

Be it known that we, HARRY HERTZBERG and MAURICE J. WOHL, citizens of the United States, residing in the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented a certain new and useful Rheostat, of which the following is a specification.

This invention is a rheostat for electrical apparatus and appliances, and the object in view is to rapidly dissipate the heat developed in an electrical resistance by the admission of a current thereto.

A further object is to simplify the construction, thoroughly insulate the resistance from electrical contact with the heat radiating surfaces, and on the whole produce a device which can be manufactured economically.

In the accompanying drawings, we 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 side elevation of a variable resistance device constructed in accordance with this invention. Fig. 2 is a vertical section on the line 2—2 of Fig. 1. Figs. 3 and 4 are side and end views of a fixed resistance rheostat embodying this invention.

The construction shown in Figs. 1 and 2 is a variable resistance rheostat wherein a resistance element, such as a fine wire or ribbon, A, is confined by and between two masses of heat radiating metallic plates or bodies, B, C. Each plate is composed of metal which quickly absorbs the heat developed by the resistance when an electric current passes through the same, and for this purpose we have found copper plates to be well adapted. The plates, B, C, are of suitable thickness and size to accommodate the resistance and, practically, to confine said resistance within the edges of said plates.

We prefer to use a metallic wire or ribbon as the electrical resistance of the rheostat for the reason that it may be easily and quickly coiled on a core, *a*, and for the further reason that it may be connected to good advantage with a series of contacts, D, but we do not desire to limit ourselves to the use of such metallic wire or ribbon as the resistance for the reason that under some circumstances we may employ a resistance composed of carbonaceous material.

Any desired number of contacts, D, may be used according to the capacity of the rheostat, and in Fig. 1 we have shown a series of five contacts, although it will be understood that the number may be increased or decreased, as desired. Each contact consists, preferably, of a metallic plug which is seated in an insulating bushing, *d*, the latter being fitted in a recess, *d'*, of one of the radiating plates, such as C. Each bushing is provided with a neck, d^2, adapted to receive a screw, *e*, the latter passing through said neck of the bushing so that its head is on the inner side of the plate, C, the shank of said screw being threaded into the contact, D, for the purpose of holding the latter securely in place within the bushing, one end of said contact being exposed on the outer face of the plate, C. Said contacts, D, are in the path of a switch lever, F, which is arranged close to the exposed face of the radiating plate, C. Said lever is pivotally mounted by suitable means, such as the bolt, *f*, which passes through the insulating bushings, *f'*, fitted in an opening of the plate C. As shown in Fig. 2, an insulating washer, f^2, lies between the plate, C, and the pivoted end of the lever F, and said lever is provided with a suitable knob or operating piece, f^3.

The radiating plate, B, is provided on its inner face with depressions, *b*, adapted to receive the heads of the screws, *e*, and the end of the screw bolt, *f*, in order that the two members, B, C, may be held in close contact with the resistance, A. Suitable means are provided for clamping said plates, B, C, tightly upon the resistance in order that intimate contact may be secured between said plates and the resistance, whereby the metallic masses formed by said plates, B, C, are adapted to rapidly absorb the heat developed in said resistance. As shown, the plates B, C, are held together by means of screws or bolts, *b'*, which pass through suitable openings of the two plates, but other clamping devices may be substituted for the screws or bolts in order to hold the heat absorbing elements of the rheostat into close contact with the resistance, as will hereinafter appear.

As heretofore stated, the resistance wire

or ribbon, A, is coiled on a core, *a*. We prefer to employ a core composed of a thin layer of mica as an insulating medium, such material being used for the purpose of electrically insulating the convolutions of the resistance winding from one another, and because this particular material permits the practically unobstructed transmission of the heat developed in said resistance. The resistance is, furthermore, insulated from electrical contact with the heat absorbing and radiating plates, and as shown in Fig. 2, the electrical insulating means consists of layers, *c*, *c'*, of mica. Said layers of mica cover the inner faces of the plates, B, C, and between the two mica layers is interposed the resistance A, the winding of which resistance is in direct contact with the layers, *c*, *c'*.

G, G' are the binding posts secured to one plate, such as C, of the rheostat. From the post, G, extends a wire, *g*, which is carried between the plates, B, C, and the insulations thereof, *c*, *c'*, to the pivot, *f*.

The windings of the resistance wire or ribbon are connected at different sections thereof with the contacts, D, in a suitable way, such for example as by extending said wire or ribbon at intervals from the core, *a*, to the screws, *e*, but in Fig. 1 we have shown a series of branch wires, *a'*, extending from said resistance wire or ribbon to the screws, *e*, whereby different sections or parts of the resistance are connected with the contacts, D.

The current is admitted to the rheostat by a wire, *g'*, attached to the binding post, G, and from said post extends the conductor, *g*, which is attached to the pivot, *f*, of the switch lever, F, so that the current can pass from the post, G, through the wire, *g*, and the switch lever, F, to one of the contacts, D, from whence the current passes through one branch conductor, *a'*, into and through the resistance wire or ribbon, A, and thence to the last contact, D, and by a branch conductor, g^2, to the binding post, G', and thence to the external circuit, one conductor of which is indicated at g^3.

It is evident that the switch lever, F, may be adjusted into engagement with any one of the series of contacts, D, for the purpose of including more or less of the resistance, A, in series with the circuit. With the switch lever adjusted to the position of Fig. 1, the entire resistance wire is included in the circuit, but when said lever is adjusted to the second contact, a portion of the resistance wire is cut out, and so on throughout the series of contacts.

The employment of a thin wire or ribbon which is coiled or wrapped on a thin core of insulating material, in connection with thin insulating layers, such as *c*, *c'*, of mica between the resistance wire or ribbon and the metallic masses formed by the plates, B, C, produce a simple, compact and efficient construction of a rheostat, for the reason that the metallic masses are practically in mechanical contact with said wire or ribbon so as to rapidly absorb the heat thereof. The quantity of metal employed in our rheostat, as the heat absorbing material, exceeds the capacity of the resistance wire or ribbon to produce heat sufficient to overcome any tendency of the rheostat to become overheated, and this result is secured, further, by the employment of heat absorbing members which are exposed so as to rapidly radiate or dissipate the heat which is absorbed thereby from said resistance.

The construction shown in Figs. 3 and 4 of the drawings is a fixed resistance rheostat wherein we employ plates, B', C', the radiating area of which is augmented by corrugating the exposed surfaces of said plates as indicated at C^2. It will be understood that the device of Figs. 3 and 4 does not embody the series of contacts and the switch lever. As a convenient means for firmly clamping the resistance and the insulating layers between the plates forming the metallic masses, we have devised a construction wherein wedges are adapted to tighten said plates upon the interposed resistance. The plate, B', is shown as having arms, h, adapted to extend through notches in the edges of the plate, C', said arms being provided with lugs, h', which fit beneath the edges of the plate, C', see Fig. 4. Between the underside of the plate, C', and the lugs, h', are driven the wedges, H, which when tightened will draw the plates, B', C', toward each other in a manner to tightly clamp said plates upon the resistance.

We prefer to employ a resistance consisting of a wire or ribbon, A, coiled on the core, *a*, and placed between layers, *c*, *c'*, said core and said layers being composed of mica. The respective end portions of the resistance A, are extended beyond the ends of the metallic masses, B', C', to enable the electric wires or conductors to be attached thereto conveniently.

It will be understood that the wedges may be used in the construction of the variable resistance rheostat shown in Figs. 1 and 2 for the purpose of clamping the plates upon the interposed resistance; and, furthermore, the plates, B, C, of said Figs. 1 and 2 may be corrugated on their exposed faces in order to increase the effective radiating area thereof.

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

1. A rheostat comprising a plurality of heat-absorbing separable metallic masses having exposed corrugated radiating surfaces, an electrical resistance between said metallic masses, keepers extending from one

mass into coöperative relation to the other mass, and wedges coöperating with said keepers and with one of the masses for clamping both masses into firm mechanical engagement with said interposed resistance, said wedges being insertible by a driving operation.

2. A rheostat comprising a plurality of separable heat-absorbing and heat-radiating metallic masses the surfaces of which are exposed to air, an electrical resistance between the masses, connecting means intermediate said masses, and wedges coöperating with said connecting means and operating to clamp said metallic masses into firm mechanical engagement with the interposed resistance.

3. A rheostat comprising a plurality of separable metallic masses one of which is provided with external wedge-receiving members, an interposed resistance, and wedges coöperating with said wedge-receiving members and acting to clamp said separable masses into close mechanical engagement with resistance between them.

4. A rheostat comprising a plurality of heat-absorbing and heat-radiating masses of metal separable from each other, a resistance confined by and between said metallic masses, and coöperating wedge devices acting upon said masses for clamping them into firm mechanical engagement with said interposed resistance.

5. A rheostat comprising a plurality of separable masses composed of metal capable of rapidly absorbing the heat of an electrical conductor, an insulated resistance conductor between said masses and unattached thereto, and coöperating wedge devices for clamping the metallic masses into firm mechanical engagement with the resistance conductor, the aggregate heat-absorbing capacity of said metallic masses exceeding the heat producing capacity of the resistance conductor, whereby the heat will be absorbed by said masses as rapidly as it is developed in the resistance.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HARRY HERTZBERG.
MAURICE J. WOHL.

Witnesses:
H. I. BERNHARD,
JAS. H. GRIFFIN.