J. BUTLER.
Electrical Rheostat.

No. 217,331. Patented July 8, 1879.

Fig. 1.

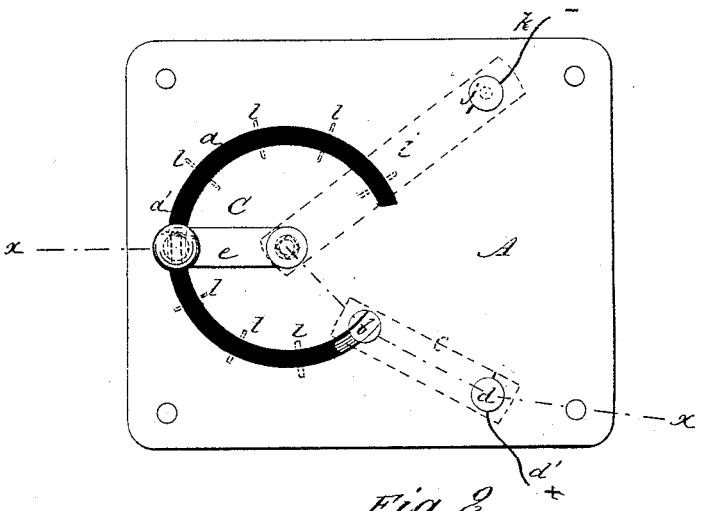


Fig. 2

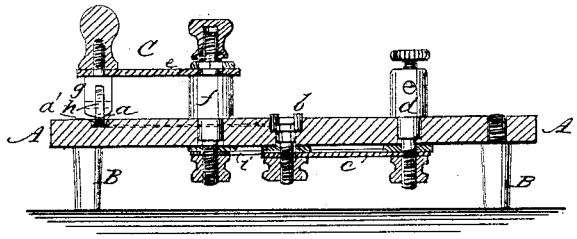
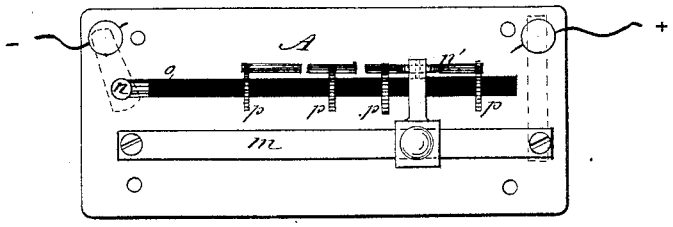


Fig. 3



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JOHN BUTLER, OF NEW YORK, N. Y.

IMPROVEMENT IN ELECTRICAL RHEOSTATS.

Specification forming part of Letters Patent No. **217,331**, dated July 8, 1879; application filed November 8, 1878.

To all whom it may concern:

Be it known that I, JOHN BUTLER, of the city, county, and State of New York, have invented a new and Improved Rheostat, of which the following is a specification.

The object of this invention is to provide a rheostat for electric circuits in which the desired amount of resistance can be quickly obtained and accurately determined and measured.

It consists of a plate of non-conducting material, on which is placed, either on the surface or in a groove, a film of plumbago or a plating of nickel or other suitable resisting material. One end of this resistant is connected with the battery, and the circuit is completed through a movable key, one end whereof is on the resistant, so that by changing the distance of the key from the extremity of the resistant joined to the wire from the battery the amount of resistance is determined at pleasure.

In the accompanying drawings, Figure 1 is a plan of my improved rheostat. Fig. 2 is a section of the same on line *x x*, and Fig. 3 shows a modified form of the improvement.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the bed-plate, supported on legs B. It is made of hard rubber, glass, or any other suitable non-conducting material. In the upper surface of this table is a segmental groove, *a*, having at one end a slotted screw or stud, *b*, passed through the plate and joined underneath to a metal strip, *c*, the other end whereof is connected with the under end of the binding-post *d*, to which the wire *d'* is joined above. In this groove is placed a film of plumbago, (indicated by *a'*,) or other suitable resisting material, as will be hereinafter referred to.

The key C, for regulating the resistance, is composed of the horizontal arm *e*, one end pivoted to the stud *f*, (the center whereof coincides with the center from which the groove *a* is struck.) The opposite end of the arm is joined to the right-angular stud *g*, in the free end of which is pivoted a friction-wheel, *h*, resting in groove *a* on the resistant *a'*.

The lower end of stud *f* projects through plate A, and is connected with one end of metal strip *i* under the plate, the opposite end of said strip being joined to the binding-post *j*, to which wire *k* is connected.

Across the groove *a*, in radial lines, are placed strips of tin-foil *l*, at regular or irregular intervals. These strips graduate the groove and are intended to indicate the point to which the key must be moved in order to obtain a certain required resistance.

The operation of my improvement is as follows: When the key is turned so that the friction-wheel is in the slot in screw *b*, the current flows from metal connection *c*, through key C, thence through metal strip *i* to wire *k*. When resistance is required the key is moved over the groove until it reaches the point marked by the tin-foil strip indicating the number of ohms of resistance desired. Now, the current has to flow through the resistant in the groove *a* before reaching the key, and thus the resistance desired is obtained.

In Fig. 3 a modification of the invention is shown. Here the groove is straight, lined with a film of plumbago, or a metal resistant where low resistance will answer, and graduated like the above.

The arm of the key is slotted and passed upon the straight metal bar *m*, so as to slide freely back and forth, and is provided with a set-screw to fix it in any required position on the bar.

The roller or wheel *w'* on the key runs on the side off the resistant *o*, but parallel to it. Narrow strips *p*, of tin-foil, with right-angular end pieces, are placed across the resistant at right angles, so as to be crossed by the friction-wheel when moved back and forth. In this way the resistant is brought into the circuit. The tin-foil strips serve to graduate the resistance, as before described.

The advantage of this arrangement is, that the plumbago, being free from the friction of the wheel, is not worn away, and thus its conductivity is not lessened, and greater accuracy is obtained. This arrangement may be applied to the segmental groove first described, as well as to the modification shown in Fig. 3.

As a resisting medium I employ the film of plumbago, or else, where a low resistance is sufficient, there may be a plating of nickel or other metal instead of the plumbago.

To plate the hard-rubber plate it is first

dipped in silver-strike, and then a deposit of nickel or other plating metal is made upon the plate at the proper place, either in the groove or on the surface in the path of the key.

Another way is to plate the plumbago with a deposit of copper when a very low resistance will answer. The plumbago film can be placed on the plate by rubbing the point of a lead-pencil in the groove, if employed, but if not, on the roughened surface of the plate in the line of the movement of the key.

While a groove is shown and described it is not essential that the resistant should be placed therein under all circumstances. In cases where a groove could not conveniently be made in the plate, (where the latter is of glass, for example,) a segmental or straight band of the plumbago or metal plating can be placed upon the plate, forming a track upon which the key moves; or, in case the tin-foil graduating-strips are employed, the key can be moved in a parallel line to the resistant, so as to cross these strips, as before described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

As an improvement in rheostats, the plate A, with a resistant of plumbago or metal plate, (placed on the surface or in a groove in said plate, so as to form a connection with a movable key,) one end of said resistant being joined to one of the wires of the battery, in combination with the movable key C, joined to the other wire of the battery, whereby the full force of the current or a diminished force accurately measured and determined can be utilized at pleasure, substantially as described.

JOHN BUTLER.

Witnesses:

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