(No Model.)

C. WILLMS.

RHEOSTAT.

No. 475,529. Patented May 24, 1892.

Fig. 1.

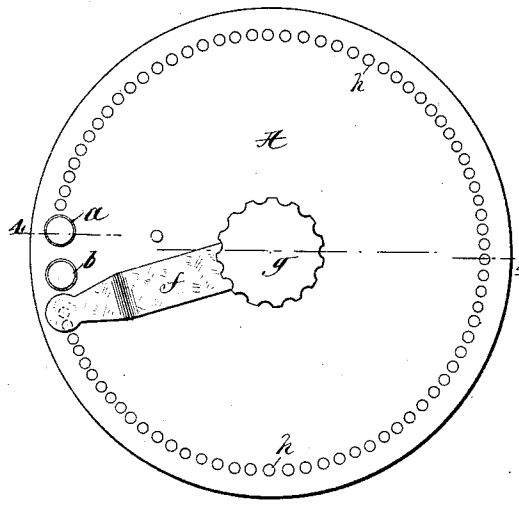


Fig. 2.

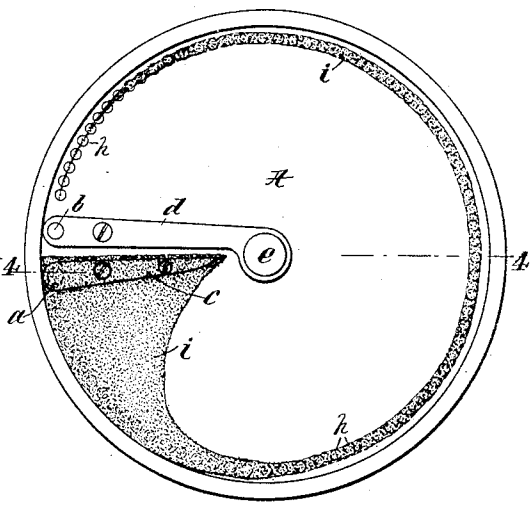


Fig. 3.

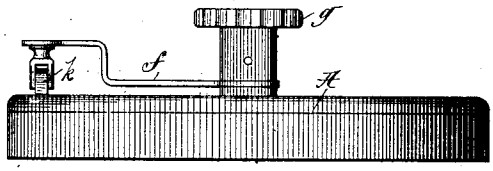


Fig. 4.

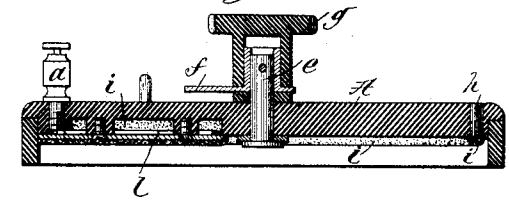


Fig. 5.

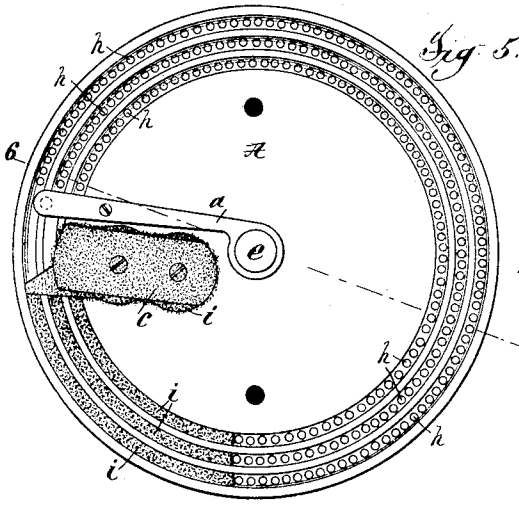
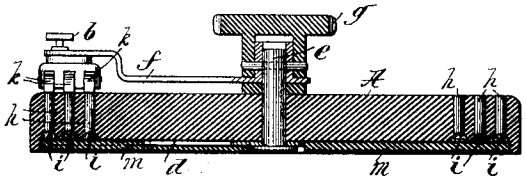


Fig. 6.



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CHARLES WILLMS, OF BALTIMORE, MARYLAND.

RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 475,529, dated May 24, 1892.

Application filed January 14, 1892. Serial No. 418,037. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WILLMS, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Rheostats, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to improve the construction of rheostats or current-regulators; and especially to provide an improved rheostat of that class employing a plastic resistance material or compound forming a path for the current between the terminals and a series of conductors with any one of which the other terminal is brought in contact, according to the resistance desired.

As a full understanding of my invention can best be given by a detailed description of a rheostat embodying the same, such description will now be given in connection with the accompanying drawings, and the features forming my invention specifically pointed out in the claims.

In the drawings, Figure 1 is a plan view of a convenient form of rheostat embodying my invention. Fig. 2 is a reversed plan of the same. Fig. 3 is a side elevation. Fig. 4 is a section on the line 4 4 of Figs. 1 and 2. Fig. 5 is a reversed plan of a modified form of rheostat with the bottom plate removed. Fig. 6 is a section on the line 6 6 of Fig. 5.

Referring now especially to Figs. 1 to 4, A is a block of insulating material, preferably rubber, and *a b* the binding-posts, mounted thereon and forming the terminals. The binding-posts *a b* pass through the block A and connect, respectively, with metallic contact-plates *c d*, secured to the under side of the block, the plate *c* forming a contact-plate from which the current passes through the insulating material, and the plate *d* connecting by means of a stud *e*, extending through the middle of the block, with a contact-arm *f*, moving in the arc of a circle over the top of the block and actuated by means of an insulating finger-piece *g*, connected to the stud *e* and arm *d* by a cross-pin, as shown, or in any other suitable manner. The contact-arm *f* moves over and makes contact with a series of conductors consisting in the form shown of pins *h*, preferably level with the top of the block and extending through the block so as to be level with or project from the under side of the same. While these conductors are shown as pins and as of the same size on both sides of the block, it will be understood that they may be of any other suitable construction and that the area of their surface on the under side of the block may be increased in any suitable manner if a wider conducting-surface in contact with the resistance material be desired. The contact-arm *f* may connect directly with the conductors *h;* but contact is preferably made by a pivoted block *k*, carried by the arm *f* and having a flat surface on the under side, so as to form an extended contact-surface, the block *k* being preferably of sufficient width so as to make contact with two of the conductors simultaneously. The danger of breakage of the circuit through failure of the arm *f* to make contact with the conductors where only one is engaged is thus avoided, and the pivoted connection of the block *k* with the arm *f* permits the block to adapt itself to any unevenness and secures a good contact. The binding-post *a* may make contact directly with the plate *c;* but for the purpose of securing a large outlet and full conduction for the current I preferably connect the binding-post *b* with a wire *l*, which is bent within a recess in the under side of the block, so as to make contact with a large part of the inner surface of the plate *d*, which is secured to the block so as to cover the recess, space thus being afforded for packing the resistance material about the wire and the inner side of the plate. The conductors *h* extend about the block in the arc of a circle, which is shown in the drawings as nearly complete; but it will be understood that the length of the arc may be varied as desired and may be any portion of a circle and that the circular form is not essential, but is adopted simply on account of convenience in making contact with a single point through an arm swinging in the arc of a circle. The conductors *h* on the under side of the block are covered to the desired thickness with insulating material, which is applied so that the path of resistance material is of substantially the same width as the conductors on the under side of the block throughout the greater portion of the path. For the purpose, however, of securing a very large resistance at the starting-point the resistance

material is preferably applied so as to form a very narrow path for a small distance from the starting-point. For the purpose of securing a large outlet for the current at the opposite end the width of the path of resistance material at this end is preferably made as great as possible, extending the full length of the plate *c*, and for the purpose of securing the greatest possible conductivity between the resistance material and the binding-post *a* the resistance material preferably entirely covers the plate *c* on the under side of the block and is packed into the recess containing the wire *l*, so as to completely surround the wire and the side of the plate *c* inside the recess.

It will be understood that the resistance material may be of any suitable material capable of being applied to the under side of the block, so as to form a path for the current between the conductors *h*. A mixture of finely-divided carbon, in the form of plumbago or lamp-black and glue or other suitable non-conductive material, is generally used; but any other suitable compound or mixture may be used. The thickness of the resistance material upon the conductors may be varied as desired in accordance with the amount of current for use with which the rheostat is intended. If a very light current is to be used, only a thin layer of resistance material is required, and this will be increased with the quantity of current the rheostat is designed to transmit.

In the construction thus far described I have shown only one series of conductors. It is evident, however, that two or more series may be used, and in some cases this will be preferable. In Figs. 5 and 6 I have shown a construction in which three series of conductors are employed. By the use of two or more series of conductors and two or more paths of resistance material I am able to provide a small rheostat, which may be used with very large currents without danger of burning out the contacts, and, moreover, I secure greater certainty that the circuit will not be accidentally broken through failure of contact of the arm *f* with one of the conductors or of one of the conductors with the resistance material, the contact-arm *f* in this case being provided with blocks *k*, moving over the three series of conductors, so that in case of the failure of one block to make good contact between the arm *f* and its line of conductors this result will be accomplished by the other conductors. In these figures, also, I have shown the block as provided on the under side with grooves for the reception of the resistance material outside the conductors, and this feature forms a part of my invention. By the use of these grooves the resistance material may be more rapidly applied, so as to form a path of the desired width, and the material is more closely held in place and less liable to flake off or to be accidentally removed. I am thus enabled, also, to apply securely a thicker body of resistance material and to apply a plate *m* to the under side of the block A directly against the face of the resistance material, the resistance material being flush with the bottom side of the block A, and the resistance material is thus positively held in the grooves without any tendency of the holding-plate to break down the body of resistance material.

It will be understood that my invention is not to be limited to a rheostat of the general construction shown, but that the features forming my invention may be applied to rheostats of other forms.

What I claim is—

1. In a rheostat, the combination, with a supporting-block provided with grooves, of a conducting-plate with which one conductor of the circuit connects, one or more series of conductors arranged in said grooves and extending through the block, a movable contact-piece with which the other conductor of the circuit connects and which is adapted to form contact with any one of each series of conductors, and resistance material applied to the conductors within the grooves and forming a path or paths for the current between the conducting-plate and successive conductors, substantially as described.

2. The combination, with insulating-block A, of conducting-plate *c* on one side of the block, with which one conductor of the circuit connects, contact-piece *f* on the other side of the block, mounted to move in the arc of a circle and with which the other conductor of the circuit connects, one or more series of conducting-pins *h*, extending through the block and arranged on the circle traversed by the contact-arm *f* to form contact therewith, and resistance material on the same side of the block as conducting-piece *c* and forming a path or paths for the current of substantially the same width as the conducting-pins *h*, substantially as described.

3. The combination, with insulating-block A, having grooves on one face, of conducting-piece *c* on one side of the block, with which one conductor of the circuit connects, contact-piece *f* on the other side of the block mounted to move in the arc of a circle and with which the other conductor of the circuit connects, one or more series of conducting-pins *h*, extending through the block and arranged on the circle traversed by the contact-arm *f* to form contact therewith, and resistance material applied within the grooves on the same side of the block as conducting-piece *c* and forming a path or paths for the current, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CH. WILLMS.

Witnesses:
JAMES J. WARRINGTON,
WM. H. JONES,