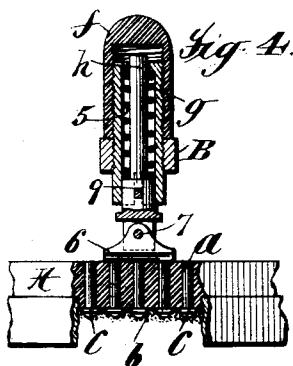
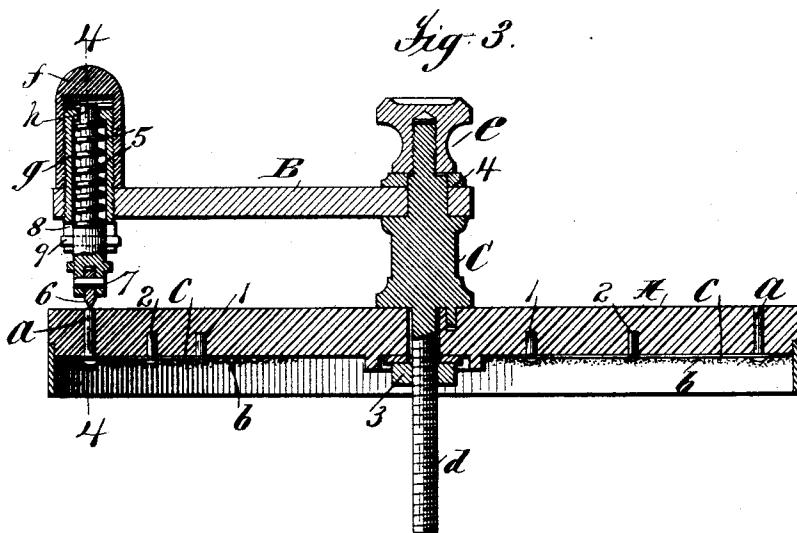
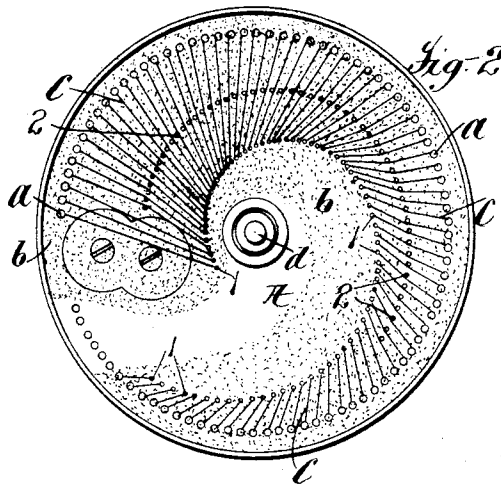
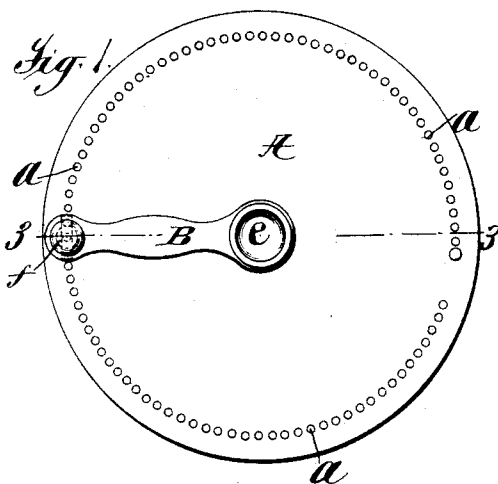


(No Model.)

C. WILLMS.
RHEOSTAT OR OTHER CIRCUIT CONTROLLER.

No. 541,136.

Patented June 18, 1895.



Attest:
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by
Philip M. Munn, Atty.
Atty.

UNITED STATES PATENT OFFICE.

CHARLES WILLMS, OF BALTIMORE, MARYLAND.

RHEOSTAT OR OTHER CIRCUIT-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 541,136, dated June 18, 1895.

Application filed November 26, 1894. Serial No. 529,915. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WILLMS, a citizen of the United States, residing at Baltimore city, State of Maryland, have invented certain new and useful Improvements in Rheostats or other Circuit-Controllers, 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 provide an improved rheostat of a general class of which my prior Letters Patent Nos. 467,338 and 475,528 show examples, in which a plate of non-conducting material is used over which the contact arm moves and which is provided with a series of contact pins passing through the plate and closing circuit through resistance material applied to the under side of the plate, certain features of the invention relating particularly to a rheostat of the special construction claimed in Patent No. 467,338, in which the resistance material is divided into sections by a series of collecting sectors consisting preferably of wires extending across the resistance material.

The invention relates in part also to other features which are applicable generally to rheostats of this general class, and in other similar constructions employing a contact piece and series of contacts.

For a full understanding of the invention, a detailed description of the same will now be given in connection with the accompanying drawings forming a part of this specification, in which a rheostat of the preferred construction embodying all the features of the invention is shown, and the features forming the invention will then be specifically pointed out in the claims.

In the drawings, Figure 1 is a top plan view of the rheostat. Fig. 2 is a bottom plan view of the same. Fig. 3 is a cross-section on the line 3 of Fig. 1. Fig. 4 is a section on the line 4 of Fig. 3.

Referring now to said drawings, A is the rheostat block of insulating material; B, the contact arm moving over the top of the block, *a*, the contact pins extending through the block; *b*, the resistance material on the under side of the block through which the pins extend, and *c, c* collecting sectors consisting of a series of wires extending transversely

across the resistance material, for the purpose fully described in the Patent No. 467,338 above referred to. These wires, as in the patent above referred to, are connected at their outer ends to the contact pins *a* and at their inner ends to pins 1. It is found in practice, however, that these wires, especially the longer ones at the wider portion of the resistance material, are liable to become loose in the resistance material and fail to make good contact with it, especially on account of the expansion and contraction due to heat and cold. In accordance with the present invention, however, I avoid this difficulty by placing midway of the wires, especially of the longer ones, another series of pins 2, which act as tension pins, and, as shown, are preferably used to tighten the wires by pressing the latter out of the straight line between the pins *a* and *b*. The wires are thus tightened, the length of the wires between pins reduced, and any detrimental loosening of the wires from expansion and contraction avoided.

It will be understood that the pins may be applied in any suitable manner to secure the desired result of holding the wires under proper tension at all times, and that more than one such pin may be introduced between the end pins, if desired, this depending somewhat upon the size of the rheostat and length of the wires, but I have found that one pin in constructions of the size in common use is sufficient.

Referring now to the other features of the invention, which relate to the parts by which contact is made with the pins *a*, the contact arm B is mounted upon a hub C which is provided with a screw threaded shank *d* extending through an opening in the plate A and secured therein by nut 3, so that the hub may be readily introduced into and removed from the plate. The screw *d* also provides a simple and convenient means for securing the rheostat in position, as it may thus be screwed down upon any table or plate desired.

The contact arm B is secured upon the hub by means of a washer 4 and set nut *e*, so that the contact arm may readily be removed. The contact arm carries at the end a hollow cap or head *f* within which is a sleeve *g* in which is mounted a rod *h* spring pressed downward by spring 5 pressing against a shoulder on the

rod and the inner end of the sleeve through which the rod passes, which rod carries at its lower end a contact piece 6 which is secured therein by a pin 7, and, as shown in Fig. 3, is brought to quite a sharp edge, and preferably, as shown in Fig. 1, is of sufficient length to extend over three of the contact pins *a*. This contact piece is preferably pivoted by being mounted loosely on or by the pin 7, so that the edge of the contact piece will adjust itself to any inequalities of the surface over which it moves. This edged contact piece secures a good contact, as it will cut its way down through any deposit on the pins so as to always reach the metal, this feature being particularly valuable on account of the expansion of the material forming the block A, which otherwise might prevent contact between the contact piece and the pins, and by mounting the contact piece loosely as described, so as to be free to oscillate as it passes over the pins. The edge is always in position to secure the longest contact possible and will shift its angle in accordance with the incline formed by the tops of the pins over which it lies at any time. By the spring pressure upon the contact piece by spring 5, the contact piece will follow down as the contact pin or pins wear, and thus secure contact independently of wear on either of the members, and this spring pressure is of especial value in connection with the oscillating contact piece.

The sleeve *g* is held from passing into the head *f* so as to leave space enough for the play of the rod *h* by a shoulder 8 abutting against the under side of the contact arm and this sleeve is slotted at its lower end and the rod *h* guided therein by a pin 9 carried by the rod and entering the slots on opposite sides so as to keep the rod from turning and thus hold the edge of the contact piece 6 in position longitudinally of the pins. It will be seen that this construction permits all the parts to be removed readily from the contact arm, when the latter is removed from the block.

What is claimed is—

1. The combination with a rheostat having a body of resistance material forming a path for the current and divided into sections by a series of collecting sectors consisting of wires extending across the resistance material and secured at their ends, of tension pins for the wires intermediate of their ends, substantially as described.

2. The combination with a rheostat having a body of resistance material forming a path for the current and divided into sections by a series of collecting sectors consisting of wires extending across the resistance material and secured at their ends, of tension pins for the wires intermediate of their ends, and placed out of line with the end pins, substantially as described.

3. The combination with the insulating block A and contact arm B carrying a con-

tact piece, of a series of contact pins *a* extending through the block, resistance material on the opposite side of the block from the contact arm forming a path for the current of gradually decreasing width, pins 1 corresponding to contact pins *a*, and on the opposite side of the path of resistance material, wires *c* connecting pins *a* and 1 and embedded in the resistance material, and tension pins 2 between pins *a* and 1, substantially as described.

4. The combination of a series of contacts, and a contact piece, one of said members being movable relatively to the other for making contact between the contact piece and the different contacts, said contact piece having an edge by which the contact is made, substantially as described.

5. The combination of a series of contacts, and a spring pressed contact piece, one of said members being movable relatively to the other for making contact between the contact piece and the different contacts, said contact piece having an edge by which the contact is made, substantially as described.

6. The combination of a series of contacts, and a contact piece, one of said members being movable relatively to the other for making contact between the contact piece and the different contacts, said contact piece having an edge by which the contact is made extending in the line of the contacts and of sufficient length to cover two or more of the contacts, substantially as described.

7. The combination of a series of contacts, and a contact piece pivoted to oscillate transversely to the contacts, one of said members being movable relatively to the other for making contact between the contact piece and the different contacts, said contact piece having an edge by which the contact is made, substantially as described.

8. The combination of a series of contacts, and a spring pressed contact piece, one of said members being movable relatively to the other for making contact between the contact piece and the different contacts, said contact piece having an edge by which the contact is made extending in the line of the contacts and of sufficient length to cover two or more of the contacts, substantially as described.

9. The combination of a series of contacts, and a spring pressed contact piece pivoted to oscillate transversely to the contacts, one of said members being movable relatively to the other for making contact between the contact piece and the different contacts, said contact piece having an edge by which contact is made, substantially as described.

10. The combination of a series of contacts, and a spring pressed contact piece pivoted to oscillate transversely to the contacts, one of said members being movable relatively to the other for making contact between the contact piece and the different contacts, said contact piece having an edge by which contact is made extending in the line of the contacts and of

sufficient length to cover two or more of the contacts, substantially as described.

11. The combination with insulating block A, of contact pins *a* on said block, a contact arm moving over said block and a contact piece carried by said arm and having an edge making contact with said contact pins, substantially as described.

12. The combination with insulating block A, of contact pins *a* on said block, a contact arm moving over said block, and a contact piece carried by said arm and having an edge extending in the direction of movement of the arm, substantially as described.

13. The combination with insulating block A, of contact pins *a* on said block, a contact arm moving over said block, and a contact piece carried by said arm and having an edge extending in the direction of movement of the arm, and of sufficient length to cover two or more of the pins, substantially as described.

14. The combination with insulating block A, and contact pins *a* on said block, of a contact arm moving over said block, and a contact piece pivoted in said arm to oscillate transversely to the insulating block and having an edge making contact with said contact pins, substantially as described.

15. The combination with insulating block A, and contact pins *a* on said block, of a contact arm moving over said block, and a spring pressed contact piece pivoted in said arm to oscillate transversely to the insulating block and having an edge making contact with said contact pins, substantially as described.

16. The combination with insulating block A, and contact pins *a* in said block, of a contact arm moving over said block and a spring

pressed contact piece pivoted in said arm to oscillate transversely to the insulating block and having an edge making contact with said contact pins and of sufficient length to cover two or more of the pins, substantially as described.

17. The combination with block A having contact pins *a* of contact arm B carrying the head *f*, sleeve *g* in said head, rod *h*, mounted in said sleeve and spring pressed toward the block, and edged contact piece 6 carried by said rod, substantially as described.

18. The combination with block A having contact pins *a*, of contact arm B removably mounted in said block and carrying the head *f*, sleeve *g* in said head, rod *h* mounted in said sleeve and spring pressed toward the block, and edged contact piece 6 carried by said rod, substantially as described.

19. The combination with contact arm B, of sleeve *g* mounted therein, rod *h* in said sleeve and spring pressed toward the block, a pin and slot guiding connection between the rod and sleeve, and a contact piece carried by the rod, substantially as described.

20. A rheostat having contact block A, hub C mounted thereon, screw *d* extending outside of the rheostat for securing the latter in position, and contact arm B mounted on the hub, substantially as described.

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

CHARLES WILLMS.

Witnesses:

SAMUEL S. BOGGS,
WILLIAM JOYCE LAKE.