

1,364,688.

Patented Jan. 4, 1921.

Fig. 1.

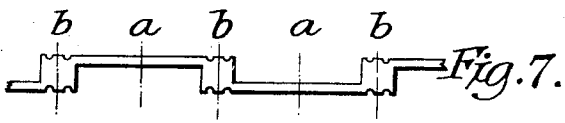
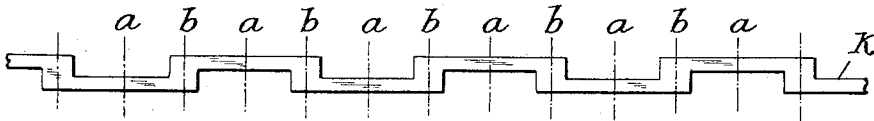


Fig. 2.

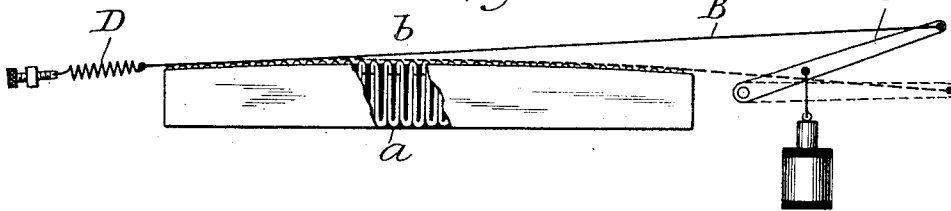


Fig. 3.

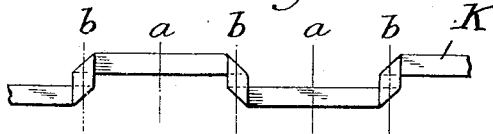


Fig. 5.

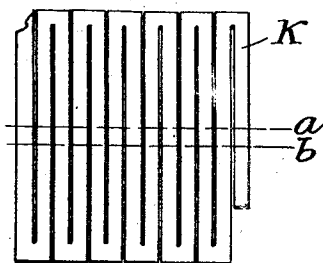


Fig. 4.

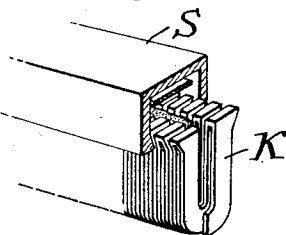
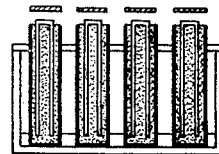


Fig. 6



Inventor

Edward M. Bentley

UNITED STATES PATENT OFFICE.

EDWARD M. BENTLEY, OF LAWRENCE, NEW YORK.

RHEOSTAT.

1,364,688.

Specification of Letters Patent.

Patented Jan. 4, 1921.

Application filed July 17, 1919. Serial No. 311,524.

To all whom it may concern:

Be it known that I, EDWARD M. BENTLEY, a citizen of the United States, residing at Lawrence, county of Nassau, and State of New York, have invented certain new and useful Improvements in Rheostats, the following being a full, clear, and exact disclosure of the one form of my invention which I at present deem preferable.

For a detailed description of the present form of my invention, reference may be had to the following specification and to the accompanying drawings, which illustrate my invention, wherein—

Figures 1 and 2 show one form of my invention;

Fig. 3 representing a modification thereof;

Fig. 4 shows the cast-metal form;

Figs. 5 to 8 illustrate various ways of embodying its essential principles.

In Letters Patent No. 1,313,853, dated August 19, 1919, I have shown and claimed a rheostat in which one or both sides of a loop are formed of a flexible conductor arranged to be pressed down progressively on the opposite side of the loop to vary the resistance. The preferred form of presser comprises a convex contact surface upon which the flexible conductor is bent progressively to vary the resistance and in one example I show a pile of carbon disks with an arched contour constituting one side of the loop. In my present invention I substitute for the carbon pile a similar pile of transverse resistance elements made of metal, the succeeding contact edges thereof being insulated from one another but connected by one or more short turns or convolutions of resistance material insufficient to cause arcing and corresponding in a general way to the surface resistance between adjacent disks of carbon in a carbon pile. The contact portions between successive turns or convolutions are specially shaped and enlarged or reinforced to form a suitable contact surface extending longitudinally of the pile. These elements are preferably formed from a stamped and folded sheet although they may be cast or otherwise produced. I also prefer to embed the resisting portions which connect the consecutive contact portions in cement, mica, or other insulation leaving the contact portions exposed on their edges at least. These contact portions, being of lower resistance, are not heated by the current to the same degree as the embedded

portions and their exposure to the air will be sufficient to dissipate such heat as the embedded portions may deliver to them by conduction. Such elements are arranged like the carbon plates with a slightly arched contact surface over which the tangential strip or ribbon bends to connect therewith progressively from end to end. Other devices for making contact may, however, be employed.

Referring to Fig. 1, K is a blank cut from a sheet with consecutive lengths offset side-wise and alternately as shown. This blank is folded alternately up and down on the lines *a* and *b* and the folded strip then pressed into a pile as shown in Fig. 2 with a film of insulation such as a mica sheet or a coating applied to the strip, between the adjacent parts. The fold at *b* forms a contact edge and the succession of such edges forms a contact surface which is made slightly arched to receive a tangential flexible ribbon B. That ribbon is arranged to bend over the arched surface and contact therewith progressively. The ribbon B is anchored at one end through a spring D and at the other end is secured to the free extremity of an oscillating lever C. Since the lever C is shorter than the ribbon its downward swing will draw the ribbon slightly to the right, thereby giving it a rubbing contact against the exposed folds B of the resistance strip.

Figs. 7 and 8 show a somewhat different form for the same essential device, the part folded at *a* being, relatively to the intermediate contact portions, of much smaller cross section (and therefore of greater resistance) than in the form in Fig. 1. Fig. 8 shows the folded pile as embedded in insulation except for a short distance below the contact fold, while the embedding insulation is anchored in a metal case from which the heat will be radiated. The heat generated in the enlarged contact portion will be less than in the embedded portion, owing to its greater conductivity while its exposure to the air will be sufficient to maintain it at a low enough temperature.

In Fig. 3 the strip K is produced by folding a continuous ribbon at intervals to form substantially the same blank that appears in Fig. 1 ready for folding on the lines *a* and *b*. Fig. 4 shows a form which may be cast, the elements in this case being short-circuited transversely across the ribbon in-

stead of longitudinally. In this case the contact surface is inclosed in a casing S to keep it free of dust while the resistance portion remains exposed to the air. Still another form is shown in Figs. 5 and 6 which will be understood without further explanation. In this case four resistance piles are arranged side by side in a common frame and the four contact ribbons can be operated simultaneously by the same handle or electromagnet. In all cases the exposed contact bends or edge may have their conductivity reinforced by electroplating or by otherwise adding metal thereto. Moreover the contact surface is flat in a transverse direction and can be made of any desired width regardless of the dimensions of the resisting portions of the conductor. The resisting conductor of rectangular cross-section which I have termed a ribbon may be of any desired thickness according to the resistance required.

What I claim as new and desire to secure by Letters Patent is:

1. A rheostat having a resistance of substantial length composed of a single continuous ribbon conductor provided with bends forming a series of turns or convolutions arranged in a pile with portions of the conductor exposed between succeeding turns to form a longitudinal contact surface.

2. A rheostat having a resistance of substantial length composed of a single continuous ribbon conductor provided with bends forming a series of turns or convolutions arranged in a pile, with the portions between succeeding turns substantially shaped to form a flat longitudinal contact surface.

3. A rheostat having a resistance of substantial length composed of a single continuous ribbon conductor provided with bends forming a series of edgewise turns or convolutions having flat contact edges between succeeding turns.

4. A rheostat having its resistance composed of a conductor formed in a series of turns or convolutions arranged in a pile with exposed insulated portions between succeeding turns forming a longitudinal arched contact surface.

5. A rheostat having a resistance of substantial length composed of a single continuous conductor provided with bends forming a series of turns or convolutions arranged in a pile with enlarged or reinforced sections between succeeding turns constituting a longitudinal contact surface.

6. A rheostat having a resistance of substantial length composed of a single continuous conductor provided with bends forming a series of edgewise turns or convolutions with extensions between succeeding turns the insulating edges of which constitute a longitudinal contact surface.

7. A rheostat having a resistance of sub-

stantial length composed of a single continuous conductor provided with bends forming a series of turns or convolutions and folded between succeeding turns to give a series of transversely extending edges insulated from one another and constituting a longitudinal contact surface.

8. A rheostat having a resistance composed of a single continuous strip of substantial length shaped in a series of turns or convolutions and folded in opposite directions alternately to form a pile.

9. A rheostat having its resistance composed of a single continuous strip of substantial length shaped in a series of turns or convolutions and folded between succeeding turns to form contact surfaces.

10. A rheostat comprising a single continuous conductor of substantial length shaped in a series of turns or convolutions arranged in a pile with exposed reinforced sections forming a contact surface extending along the outside of the pile, and means for progressively making contact with increasing or diminishing portions of said surface.

11. A rheostat comprising a single continuous conductor of substantial length formed in a pile of turns or convolutions with extensions projecting from the embedding insulation to form a contact surface extending along the outside of the pile, and means for progressively making contact with increasing or diminishing portions of said contact surface.

12. A rheostat comprising a continuous conductor of ribbon-like form and of substantial length formed as a pile of turns or convolutions embedded in insulation, reinforced portions being provided between succeeding turns, said reinforced portions projecting from the insulation to form a contact surface extending along the outside of the pile.

13. A rheostat comprising a pile of transverse metallic resistance elements having an exposed arched contact surface extending along the outside of the pile and a flexible conductor bending over said arched surface to make contact therewith progressively.

14. A rheostat comprising a resistance forming one side of a loop with arched contact surface, a flexible conductor bending tangentially over said surface to contact therewith progressively and an operating device for said conductor arranged to swing it to and from the said surface and also give it a rubbing contact thereon.

15. A rheostat comprising a resistance provided with an arched contact surface, a flexible conductor bending tangentially on said surface, and an operating device for said conductor swinging in an eccentric arc to produce a rubbing contact.

16. A rheostat comprising a resistance provided with an arched contact surface and

a longitudinally-yielding flexible conductor bending tangentially on said surface to contact therewith. 15

17. A rheostat comprising a pile of resistance elements having an exposed contact surface extending along the outside of the pile, a contact conductor extending over the entire length, said surface and a casing separately inclosing said conductor and contact surface. 20

side consisting of a conductor making contact with said arched surface progressively.

19. A rheostat comprising a series of turns or convolutions of resisting conductor with intermediate exposed contacts forming a longitudinal contact surface having an arched contour and a flexible conductor extending along said surface in tangential relation thereto and bending over it to make contact therewith progressively. 25

18. A rheostat comprising a loop one side of which is formed of a resisting conductor shaped in a series of turns or convolutions with an arched contact surface and the other

Signed at New York, county and State of New York, this 16th day of July, 1919.

EDWARD M. BENTLEY.