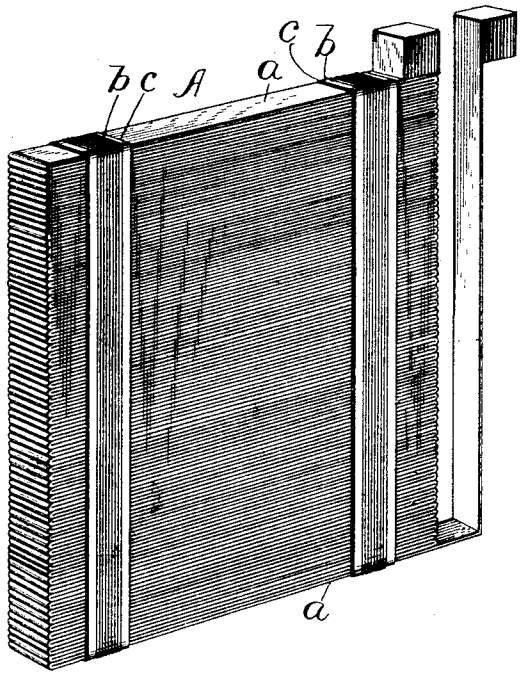
(No Model.)

G. A. BROWN.

RHEOSTAT.

No. 515,280. Patented Feb. 20, 1894.



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GEORGE A. BROWN, OF MUSKEGON, MICHIGAN, ASSIGNOR TO THE SHAW ELECTRIC CRANE COMPANY, OF SAME PLACE.

RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 515,280, dated February 20, 1894.

Application filed August 19, 1893. Serial No. 483,502. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. BROWN, a citizen of the United States, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Rheostats, of which the following is a specification.

My invention relates to rheostats and electrical resistance devices generally, and consists essentially in a resistance card, block or section, formed of metallic tape or ribbon, folded back and forth upon itself in ziz-zag form, the folds being insulated one from another by a natural scale or oxide existing or formed upon the tape or ribbon.

In the drawing, the figure is a perspective view of a resistance card or section constructed in accordance with my invention.

The purpose of my invention is to produce a cheap, durable and efficient resistance, which may be made of varying capacity within wide limits, and which shall occupy comparatively little space. To this end I employ metallic ribbon or tape, preferably hoop or band iron,—and I fold the same back and forth upon itself, making the length of the folds dependent somewhat upon the nature of the current for which it is designed, though they should in all cases be sufficiently short to preclude short-circuiting from fold to fold.

The tendency of the current to jump from fold to fold instead of passing through the entire length of all the folds, varies with the difference of potential at any point, between the folds. The greater the difference of potential or "drop," the greater the tendency to jump or short circuit, and the drop is of course dependent upon the strength of the current and the resistance of the fold. For these reasons, and in order not to make the resistance of any fold unduly high, the folds should be made of comparatively short length; but this is a matter of judgment, variable according to working conditions.

Metallic tape or ribbon, hoop or band iron, in its commercial state, bears a film or coating of "mill scale," which, in the case of iron, is ferrous oxide,—a quite poor conductor of electricity,—or a comparatively good insulator. Various other metals and alloys of metals when rolled into the form of strips, bands or ribbons, possess or acquire a coating of oxide, and metallic oxides generally are poor conductors of electricity, or quite good insulators; hence, while iron is preferred for various reasons, my invention is not restricted to its use, but comprehends any metal or alloy possessing such scale, film or coating of metallic oxide.

The natural mill scale of iron is ferrous oxide; but this, if exposed to moisture, even to that present in the atmosphere, is changed to ferric oxide, which offers higher electrical resistance than does ferrous oxide.

It may be advisable in some cases to subject the metal to the action of corroding agents to cause the formation of a heavier or more perfect coating of oxide. This may best be done after the metal is folded, but while the folds are still sufficiently free or open to permit the entrance of the corroding agent between them, because the mill scale is liable to be cracked and broken more or less in making the short bends. By thus restoring the oxide at proximate bends, the current will be prevented from short circuiting from one to another.

Referring again to the drawing, A indicates a resistance card, block or section, composed of a folded tape, ribbon or band *a*, and rendered compact and firm by suitable binding bands *b*, advisably of wire, and in such case suitably insulated from the strip *a*. Such insulation may be effected by interposing strips *c* of mica, asbestus or other incombustible insulating material between the band *a* and the wrapping or binding wire *b*, as indicated in Fig. 1, or in any usual and equivalent manner. The ends of band or strip *a* may be connected in any convenient manner with contact blocks or binding screws, and two or more cards may be connected in series, with suitable contact blocks for each, after the manner of rheostats now in general use.

Electrical resistance devices have before been made of wire, and of metallic strips bent in ziz-zag form, and I do not broadly claim such construction; but so far as I am aware, no one has ever before bound a folded metallic strip into a firm and compact body or card,

so that it should occupy the smallest possible space and be self-sustaining; nor has the oxide which naturally forms upon the metal ever before been utilized to insulate the folds from one another, to my knowledge. Such a resistance card or body possesses many and important advantages, prominent among which may be noted cheapness, high available resistance within small compass, facility of introduction into and removal from circuit, and great durability.

Having thus described my invention, what I claim is—

1. A resistance card or body composed of a strip or band of metal folded back and forth upon itself,—the folds being separated only by the scale or oxide formed upon their faces.

2. A resistance card or body composed of a metallic strip or band *a* folded back and forth upon itself and having metallic oxide upon its surface, and bands *b*, passing about the folded strip and serving to bind and retain it in compact form.

3. A resistance card or body consisting of a strip of iron, with the mill scale or oxide upon it, folded back and forth upon itself in a compact form.

In witness whereof I hereunto set my hand in the presence of two witnesses.

GEO. A. BROWN.

Witnesses:
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