No. 730,644. PATENTED JUNE 9, 1903.

C. E. HARTHAN.

RHEOSTAT.

APPLICATION FILED APR. 21, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.

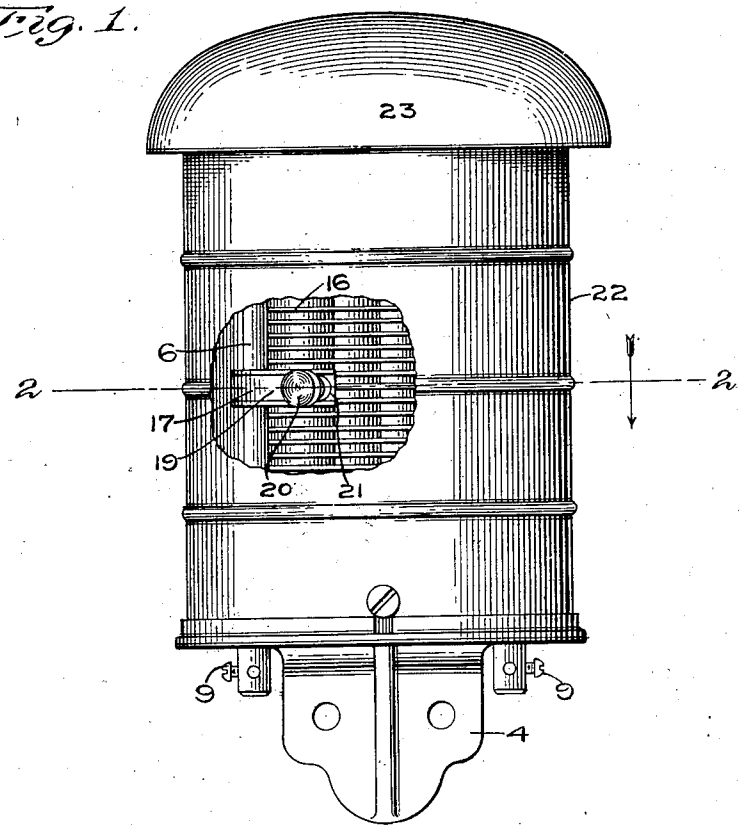
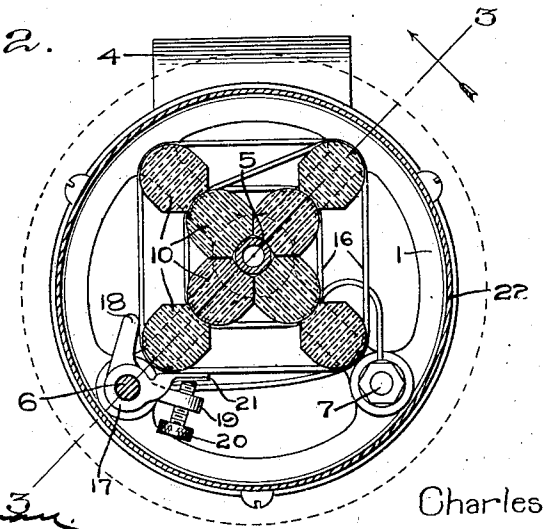


Fig. 2.



WITNESSES:

Robt. L. Hopkins.

Alex. Macdonald.

INVENTOR:

Charles E. Harthan.

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Atty.

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 3.

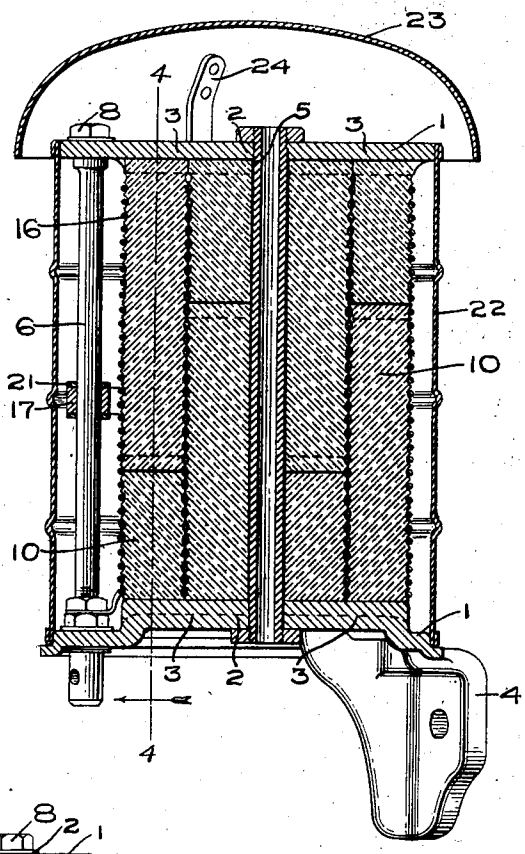


Fig. 4.

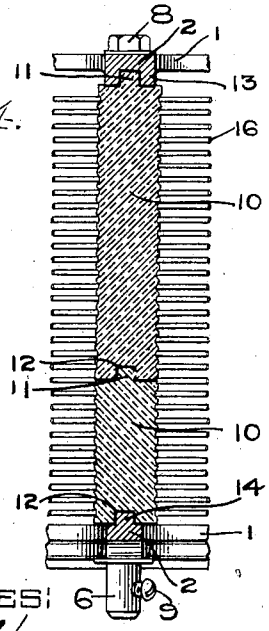
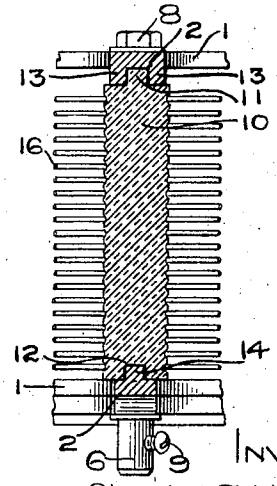


Fig. 5.



WITNESSES:
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NO MODEL. 4 SHEETS—SHEET 3.

Fig.6

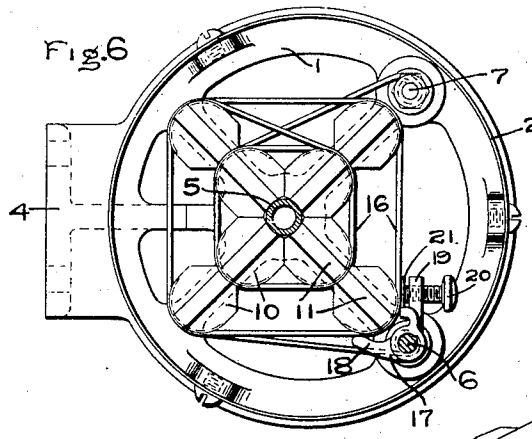


Fig.8.

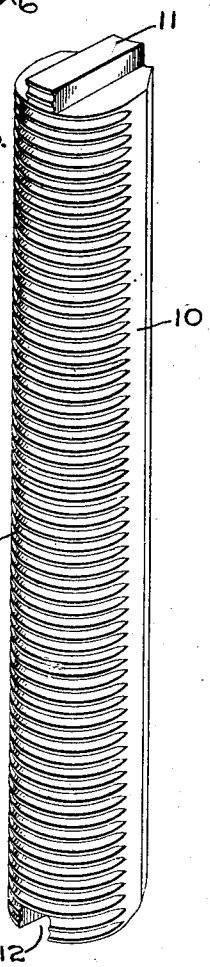


Fig.7.

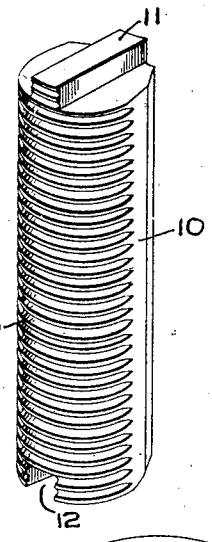
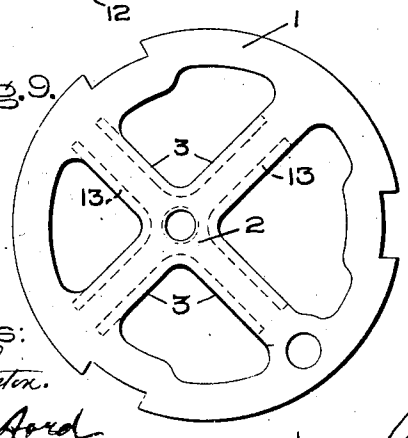


Fig.9.



Witnesses:
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Helen Orford

Inventor:
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by Albert G. Davis
Att'y.

No. 730,644. PATENTED JUNE 9, 1903.

C. E. HARTHAN.

RHEOSTAT.

APPLICATION FILED APR. 21, 1902.

NO MODEL. 4 SHEETS—SHEET 4.

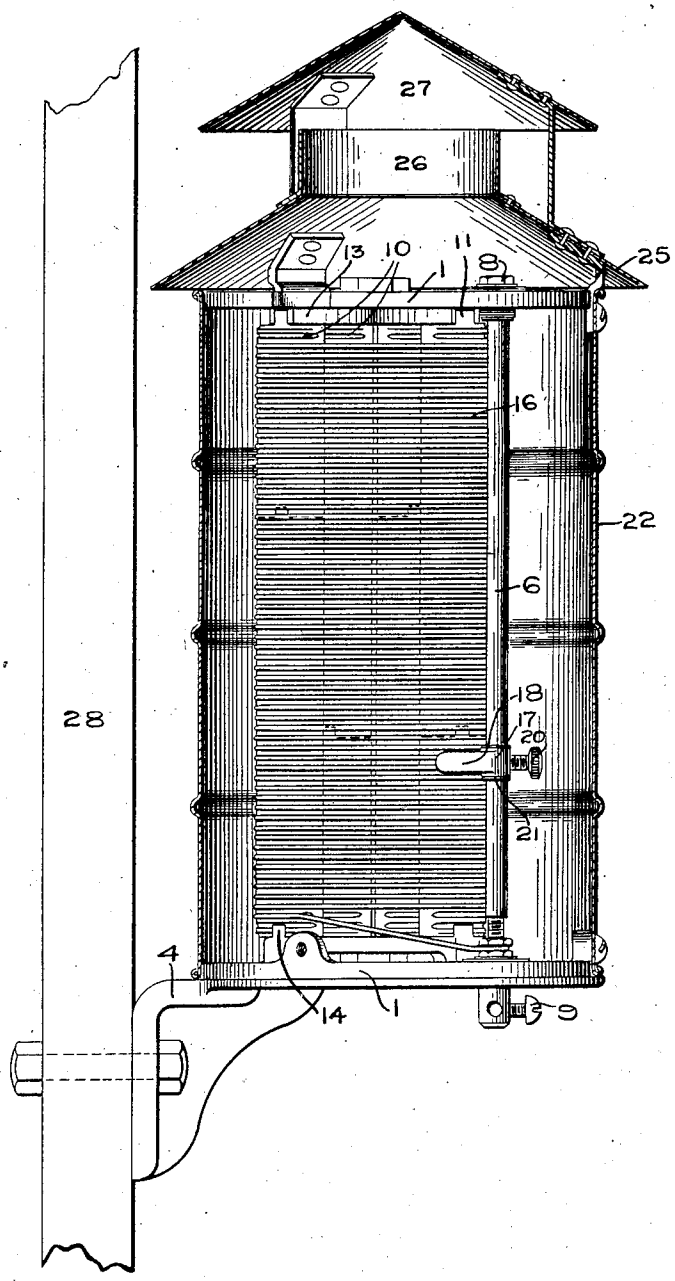

Fig. 10.

Witnesses:
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Inventor:
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Att'y.

No. 730,644. Patented June 9, 1903.

UNITED STATES PATENT OFFICE.

CHARLES E. HARTHAN, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 730,644, dated June 9, 1903.

Application filed April 21, 1902. Serial No. 103,896. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. HARTHAN, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Rheostats, of which the following is a specification.

This invention relates to apparatus for regulating an electric current; and its object is to afford a simple easily-constructed device of this character which is not costly to manufacture, is efficient in operation, can be easily adjusted, is durable, and is well safeguarded against short circuits and overheating, and is composed of similar units, which enable it to be made of any desired size by duplicating said units.

The invention consists of a rheostat composed of two concentric layers of wire wound on blocks of insulating material, such as porcelain, mounted on a strong light metal frame and housed in a sheet-metal casing.

The features of novelty will appear in the detailed description which follows and in the appended claims.

In the accompanying drawings, Figure 1 is a front elevation of my improved rheostat with the casing partly broken away. Fig. 2 is a cross-section on the line 2 2, Fig. 1. Fig. 3 is a vertical section on the line 3 3, Fig. 2. Fig. 4 is a vertical section on the line 4 4, Fig. 3. Fig. 5 is a similar section of a shorter rheostat. Fig. 6 is a top plan view with the hood removed. Figs. 7 and 8 show the blocks which support the wire. Fig. 9 is a plan view of the upper head, and Fig. 10 is a side elevation showing a modified hood.

The metal frame of the rheostat is composed of two spider-heads connected by a central standard and a side rod. The upper head has a circular rim 1, a center 2, and arms 3, connecting the rim and center. The lower head is similarly constructed, but has an offset bracket 4 cast integral with it for supporting the apparatus clear of the wall to which the bracket is secured. A standard 5, preferably tubular for the sake of lightness and ventilation, connects the centers of the two heads, which stand one above the other in parallel planes. At a point in the rim, preferably on the opposite side from the bracket, a rod 6 extends from one head to the other and is securely fastened by a nut 8. The lower end of the rod depends below the lower head and is perforated and provided with a set-screw 9, so that it serves as a binding-post for one of the circuit-terminals, the other terminal leading to a binding-post 7.

Grouped around the central standard are a plurality of blocks 10, of insulating material, preferably porcelain. The adjacent edges of the blocks are radial to the standard and preferably abut, so that the blocks are held against angular displacement. The inner edge of each block is concave and its outer edge convex, the curves being preferably both of the same radius. As this radius is preferably greater than that of the standard 5, in order not to give too sharp a curve to the outer edge of the block the inner edge will touch the standard only at its middle; but this failure to fit the standards snugly is of no consequence so long as the radial edges of the blocks abut.

The blocks engage at top and bottom with ribs on the heads, and in order to be able to put two or more blocks in line when a tall rheostat is to be built up it is preferred to make each block with a tongue 11 at one end and a groove 12 at the other adapted to fit the tongue on an adjacent block, as shown in Fig. 4. One of the heads has two parallel radial ribs 13 to receive the tongue 11, and the other head a single radial rib 14 to enter the groove 12, whereby the blocks are held securely in place.

The outer curved edges of the blocks have a plurality of transverse grooves 15 to properly space the wire 16 when it is wound upon them. If more than one layer of wire is wanted, a second series of blocks can be placed outside the first, the curve of the inner edge of each outer block fitting snugly on the outer edge of the inner block, against which it is placed. If two series of blocks are used, the wire is led from one binding-post, as 7, to and around the inner series, and when that is wound full the second series is laid in place and the wire is carried out and around said second series until it is full. The end of the wire is then secured to the lower end of rod 6.

When the rheostat is so tall as to require two or more blocks to be placed end to end, I pre-

fer to make them in two lengths, as shown in Figs. 7 and 8, and to arrange them so that those in one tier break joints with those in adjacent tiers, as shown in Fig. 3. These units can be combined in a variety of ways to produce rheostats of any desired size.

On the side rod 6 is a slide 17, having two arms, one of which, 18, bears against the outer layer of wire. The other arm, 19, carries a set-screw 20, which bears against a copper contact-shoe 21, sliding loosely on the side rod, and presses it closely against the wire. By moving the slide 17 up or down the rod the successive convolutions of wire in the outer layer are cut out or in. As the length of wire in the outer layer is greater than that composing the inner layer, it is thus possible to cut out more than half the resistance by moving the slide 17 to the top of the side rod.

A sheet-metal casing 22 incloses the wire coils, the rod, and slide. By setting the coils eccentrically to the circular casing the latter will be of a minimum size. A hood 23 is supported on the casing by braces 24, leaving an opening for the escape of hot air, the spider-like construction of the heads, the tubular standard, and the open spaces between the blocks and the wire affording a free circulation to keep the apparatus cool. In exposed situations the simple dome-shaped hood 23 may be replaced by one composed of an annular cone 25 and central chimney 26, covered by a raised conical roof 27. This will effectually prevent rain or snow from driving into the casing. The offset bracket 4 provides for such a space between the casing and a supporting-wall 28 that no additional insulation is necessary.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A rheostat comprising spider-heads and a central standard, blocks of insulating material grouped around said standard and secured in place between said heads, and resistance-wire wound on said blocks.

2. A rheostat comprising spider-heads and a central standard, blocks of insulating material grouped around said standard with radial edges in contact, and wire wound on said blocks.

3. A rheostat comprising spider-heads and a central standard, blocks of insulating material having curved inner and outer edges and grouped around said standard, and wire wound on said blocks.

4. A rheostat comprising spider-heads and a central standard, blocks of insulating material having curved outer edges provided with transverse grooves and grouped around said standard, and wire wound on said blocks.

5. A rheostat comprising spider-heads and a central standard, blocks of insulating material having inner and outer edges curved on the same radius and grouped around said standard, wire wound on said blocks, an outer series of similar blocks placed against the inner series, and wire wound on said outer series.

6. A rheostat in which the wire-supporting blocks are all alike and fit upon each other edgewise and endwise.

7. A rheostat in which the wire-supporting blocks all have inner concave and outer convex edges curved on the same radius, a tongue at one end and a corresponding groove at the other end.

8. A rheostat comprising insulating-blocks having a tongue at one end and a groove at the other end, and supporting-heads having ribs to engage with said tongue and groove.

9. A rheostat comprising a coil of wire, a rod parallel therewith, a slide on said rod, a set-screw in said slide, and a metal shoe between the set-screw and the wire.

10. A rheostat comprising a coil of wire, a rod adjacent to said coil, a slide having one arm bearing against the wire and the other carrying a set-screw, and a metal contact-shoe between said screw and the wire.

11. A rheostat comprising a coil of wire and a casing eccentric to said coil.

12. A rheostat comprising a head carrying the coils of wire and provided with an offset bracket.

In witness whereof I have hereunto set my hand this 18th day of April, 1902.

CHARLES E. HARTHAN.

Witnesses:
DUGALD McK. McKILLOP,
JOHN J. WALKER.