(No Model.)

G. H. WHITTINGHAM.

RHEOSTAT.

No. 537,876. Patented Apr. 23, 1895.

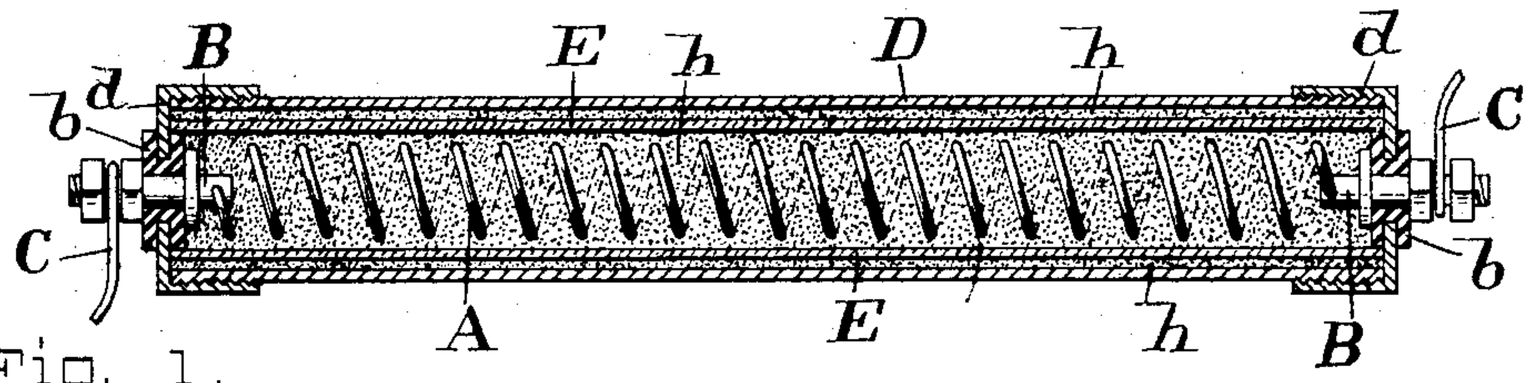


Fig. 1.

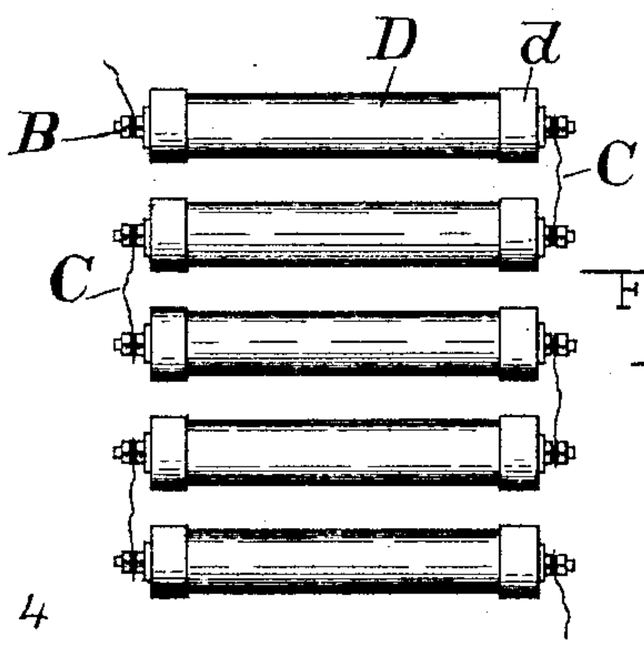
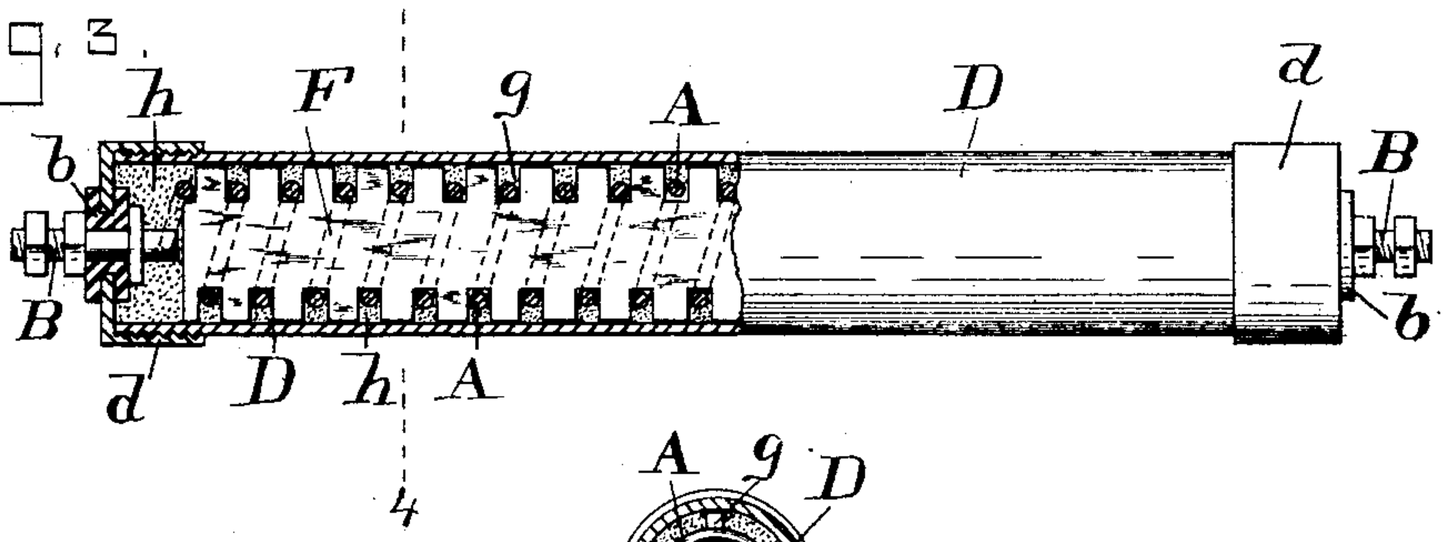


Fig. 2.

Fig. 3.



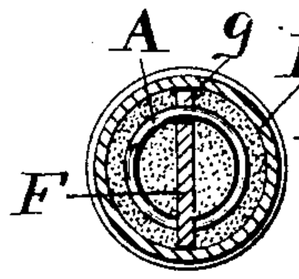


Fig. 4.

Fig. 5.

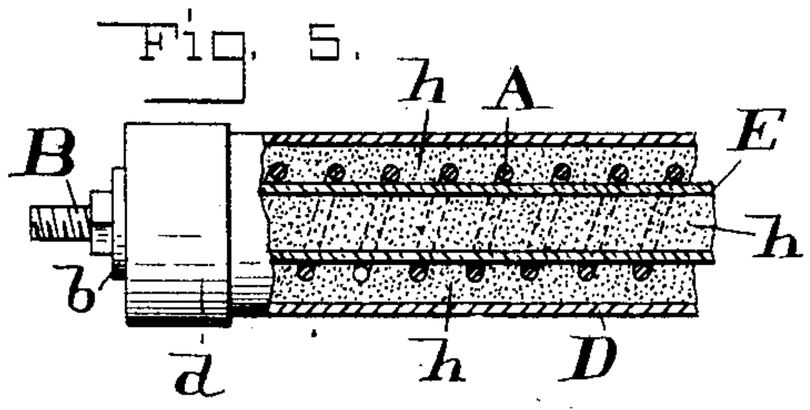
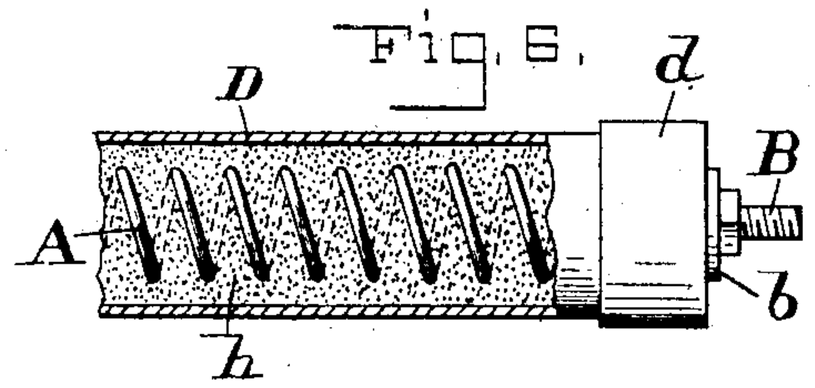


Fig. 6.



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RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 537,876, dated April 23, 1895.

Application filed December 11, 1893. Renewed September 27, 1894. Serial No. 524,302. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HERBERT WHITTINGHAM, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Rheostats, of which the following is a specification.

My invention relates to an improvement in rheostats, and has for its object to increase the current capacity of the resistance wire by providing efficient means for relieving the resistance wire of the excess of heat generated by the passage of the electric current, whereby I am enabled to pass an abnormal current continuously through a given wire without injury thereto.

In the accompanying drawings,—Figure 1 is a longitudinal central section showing one of the resistance coils and its casing, and the insulating heat-conducting filler within the casing. Fig. 2 shows on a smaller scale a group of the individual devices shown in Fig. 1. Fig. 3 is a part sectional view of a modified form of the device. Fig. 4 shows a cross-section of the modified form seen in Fig. 3. Fig. 5 is a part sectional view showing a modified form of the device in which a tube of glass or mica is surrounded by the resistance coils. Fig. 6 is a sectional view of one end of the device in its simplest form.

Referring to the drawings, the letter, A, indicates the resistance wire connected at its ends to binding posts, B, from which lead the conducting wires, C. A casing, D, of iron or other material suitable for rapidly radiating heat, incloses the resistance wire and is closed at its ends by screw-caps, *d*, through which the binding posts pass. The binding posts are insulated from the caps by means of bushings, *b*, of suitable material.

In the simplest form of my device there is within the casing, D, and surrounding the resistance wire a filling of clear loose sand, *h*, which is employed as a heat-conducting medium between the wire and the casing and at the same time electrically insulates the wire therefrom. By this construction the heat of the wire is rapidly conducted to the casing and the latter has its exterior surface exposed to the atmosphere for radiation of the heat. It will be seen that the radiating surface of the casing, D, is greatly larger than the surface of the wire it incloses.

In order to prevent any possible contact between the resistance wire and the casing, and to sustain the resistance wire I may employ a glass or mica tube, E, which is placed within the casing and may surround the resistance wire as in Fig. 1, or may extend through its coil, as in Fig. 5. In either case the sand, *h*, is filled in on both sides of the glass or mica tube so as to form a continuous heat-conducting medium from the resistance wire to the casing.

In Figs. 3 and 4 a slight modification is shown. Instead of a glass or mica tube, a strip, F, of mica or other non-combustible insulating material, is employed, of a width to fit snugly within the casing, as shown in Fig. 4. This strip is provided along its parallel edges with a number of notches, *g*, of sufficient depth to receive the coils of the wire which is placed upon the strip, the several convolutions being received and held within said notches. In this manner all liability of the resistance wire making contact with the casing is avoided. Sand, *h*, is filled in around the resistance coil and strip as in the other instance.

Asbestos and fireclay have heretofore been used as fillers to interpose between the resistance wire and its inclosing radiator, but experiment has shown that sand is equally as good as an insulator for electricity. It is equally non-combustible, is more efficient as a conductor of heat, and, what is of special importance, it has a loose granular nature which neither asbestos nor fireclay possess. This feature of the loose grains of sands insures that this packing will always closely fit about the resistance wire and between it and the casing, and thereby they are certain under any changes of condition to conduct the heat away from the wire to the casing.

The glass or mica tube as in Figs. 1 and 5, and the strip, as in Figs. 3 and 4, in each case constitute means for sustaining the resistance coil so as to prevent any one or more of the convolutions from sagging or getting out of line and coming in contact with the radiating casing, D.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. In a rheostat, the combination of a heat-radiating casing; a resistance wire within the casing; and loose sand packed within the casing and separating the resistance wire from the casing, substantially as described.

2. In a rheostat, the combination with the coiled resistance wire, of a heat-radiating casing therefor; means for sustaining the resistance coil within the casing; and a filler within the casing consisting of clear loose sand surrounding the resistance coil, as described.

3. In a rheostat, the combination of a heat-radiating casing; a resistance wire within the casing; an electric-insulating, heat-conducting tube within the casing and sustaining the resistance wire; and a filler of loose sand within the casing on both sides of the glass tube and surrounding the resistance wire, substantially as described.

4. In a rheostat, the combination of a tubular heat-radiating case; screw-caps closing each end of the tubular case; a resistance wire within the case; insulating bushing in each cap through which connection is made with the resistance wire; and loose sand packed within the case around the resistance wire.

In testimony whereof I affix my signature in the presence of two witnesses.

GEORGE HERBERT WHITTINGHAM.

Witnesses:

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