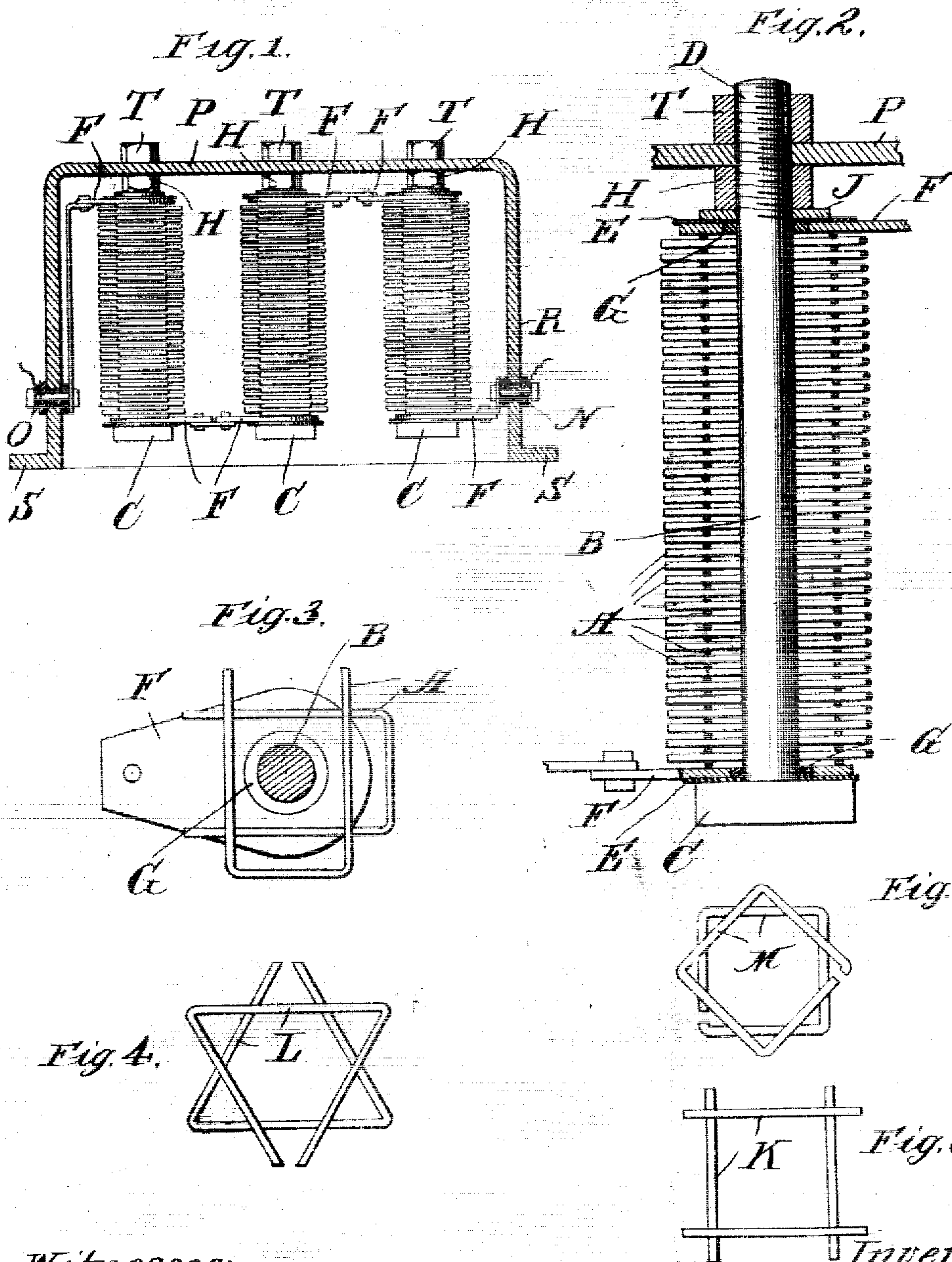


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E. C. MORGAN.
RHEOSTAT.

APPLICATION FILED DEC. 5, 1904.



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RHEOSTAT.

No. 814,913.

Specification of Letters Patent.

Patented March 13, 1906.

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To all whom it may concern:

Be it known that I, EDMUND C. MORGAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Rheostat, of which the following is a specification.

This invention relates to rheostats.

The object of the invention is to provide a rheostat which is simple and efficient and economical in construction.

A further object of the invention is to provide a rheostat wherein provision is made for efficient ventilation in order to dissipate any heat generated while the device is in use.

Other objects of the invention will appear more fully hereinafter.

The invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view in side elevation of a rheostat embodying the principles of my invention, the supporting-casing being in section. Fig. 2 is a central longitudinal view of one of the elements of the rheostat. Fig. 3 is a view in transverse section of a rheostat element embraced within the spirit and scope of my invention. Figs. 4, 5, and 6 are detail views showing modified forms and arrangements of the parts composing a rheostat element and embraced within the spirit and scope of my invention.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

In its essential characteristics a rheostat element embodying the principles of my invention comprises a series of metallic sections piled upon each other, the successive sections resting upon and contacting with each other consecutively, the pile being suitably clamped firmly in position and in such contacting relation. The metallic sections may be of any suitable or convenient form or construction and arrangement. In Figs. 1, 2, and 3 I have shown rheostat elements employing metallic sections in the form of iron wire A in loop or U shape and piled crosswise the one upon the

other, a sufficient number of such wires-sections being thus piled together or upon each other to form a rheostat element of the desired length. The pile of wire sections thus assembled may be clamped and securely held together in many specifically different ways. I have shown a simple and efficient holder or clamp device therefor comprising a bolt B, having a head C at one end and threaded, as at D, at the other end, and in building up the rheostat element I string the sections A over the bolt B, supporting the lowermost section of the pile upon the head C of the bolt, and superpose the other sections A upon each other until an element is completed of the desired length. In practice I interpose a washer E, of insulating material—such, for instance, as mica, ebonite, or the like—between the head C of the bolt and the pile of sections A, and preferably I support upon the insulating-washer E a terminal plate or connection F, by which terminal connection is made for the circuit, said terminal plate being centered therefrom in any convenient manner—as, for instance, by means of a washer G—and the pile of sections A are built up upon each other and the lowermost one of the pile resting upon the terminal plate F. At the opposite end of the element thus built up I employ a similar arrangement of terminal plate with a centering-washer G, preferably of insulating material, to center said plate with reference to the bolt B, and I clamp the entire pile together and against the head C of the bolt by means of a nut H, screwed upon the threaded end D of bolt B against a washer J and terminal plate F, with a washer E, of mica or other insulating material, interposed between washer G and the terminal plate F. In this manner the element is built up, and the sections A composing the same are firmly held and clamped together and between the nut H and head C of the bolt, said bolt occupying the space enclosed by the crossed ends or side legs of the wire or metallic sections A, as most clearly shown in Fig. 3, and out of contact with said legs and insulated from the terminal plates F.

From the foregoing description it will be seen that I provide an exceedingly simple and inexpensive rheostat element, the resistance of which is secured at the points of con-

tact of the sections A where they rest upon each other in the pile. It will also be seen that the bolt B is entirely out of contact with any of the sections composing the rheostat element. It will also be seen that I provide an open construction permitting of the free circulation of air, and hence presenting a wide radiation area, permitting the dissipation and radiation of any heat that may be generated while the rheostat is in use, and this is a valuable feature of my invention.

While I have shown a rheostat element built up of superposed U-shaped metallic sections A, of wire or other suitable form in Fig. 3, I do not desire to be limited or restricted to this arrangement. For instance, in Fig. 6 I have indicated a form in which the rheostat element is built up of short straight metallic sections K, which may be of wire and piled upon each other after the fashion of a log house. In Fig. 4 I have shown a form wherein the metallic sections L are of triangular shape, the triangles being piled in crosswise or inverted relation the one upon the other to form the rheostat element, and in Fig. 5 I have shown the sections M in the form of rectangles designed to be piled in crosswise relation the one upon the other to form the rheostat element. The form shown in Fig. 3 I have found preferable, however, because since the resistance of the element is dependent upon the number of contacts between the sections composing the element the arrangement shown in Fig. 3 presents the fewest number of such contacts—namely, four—between adjacent sections A, whereas in Fig. 4 six contacts are presented between adjacent sections L, and in Fig. 5 eight contacts are made between adjacent sections M. In Fig. 6 the same number of contacts between the strips or sections K is presented as in the case of Fig. 3; but the assembling of the sections K requires more careful handling than in the case of the U-shaped sections of Fig. 3. However, I have found all of the illustrated forms suitable for my purpose, and therefore do not desire to be limited or restricted to any specific arrangement of the sections composing the resistance element.

One or any number of rheostat elements may be employed to form the rheostat, according to the requirements. Where one element is used alone, the circuit-terminals are connected to the terminal plates F at the respective ends of the element. Where two or more elements are associated to form the rheostat, the terminal plate F at the respective ends of each element is electrically connected to the terminal plate at the corresponding ends of adjacent elements on opposite sides thereof in a well-understood manner. In Fig. 1 I have shown a rheostat employing three elements, the terminal plate at one end of the central element being connect-

ed to the terminal plate at the corresponding end of the next adjacent element on one side thereof and the terminal plate at the other end of the central element being similarly connected to the terminal plate at the corresponding end of the adjacent section on the opposite side thereof, while the other terminal plates of the outer elements are respectively connected to the circuit-terminal studs N O for connection with the line-circuit. The rheostat elements may be supported in any suitable or convenient manner. I have shown a simple and convenient arrangement to which, however, I do not desire to be limited, wherein I employ a casing having a flange portion R and a connecting web portion P, the flange portion R having, if desired, feet S to afford means for supporting or securing such casing. The web portion P of the casing is provided with holes therethrough, through which extend the threaded ends D of the rheostat-element bolts B, nuts T serving to clamp the web portion P of the supporting-casing down upon the nut H, through which the pile of sections composing the element are clamped against the head C of the bolt B.

It is obvious that the elements composing the rheostat may be supported in many other specifically different ways. I do not desire, therefore, to be limited or restricted in this respect. It is also obvious that many other variations and changes in the details of construction and arrangement would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention.

Having now set forth the object and nature of my invention and various constructions embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. A rheostat element comprising metallic sections piled upon each other to form a space therethrough and therebetween, and means for clamping the pile of sections together.

2. A rheostat element comprising metallic sections piled the one upon the other in crosswise relation to form a central opening or passage therethrough, and a clamp-bolt passing through said passage or opening for clamping said sections together.

3. A rheostat element comprising wire sections piled the one upon the other in crosswise relation, and means for clamping said sections together.

4. A rheostat element comprising sections of iron piled the one upon the other in crosswise relation, and a clamp-bolt extending through the pile and out of contact with said sections for clamping said sections together.

5. A rheostat element comprising substan-

tially U-shaped metallic sections piled in crosswise relation the one upon the other, and means for clamping said sections together.

6. A rheostat element comprising substantially U-shaped wire sections piled in crosswise relation the one upon the other, and means for clamping said sections together.

7. A rheostat element comprising sections of wire piled the one upon the other in crosswise relation to form spaces therebetween, and a clamp-bolt passing through such pile and out of contact with the sections composing the same for clamping said sections together.

8. A rheostat element comprising metallic sections piled crosswise upon the adjacent sections having a plurality of crossing-points, said sections in electrical contact with each other at the crossing-points thereof, and means for clamping said sections together.

9. A rheostat element comprising metallic sections piled crosswise upon each other, each metallic section having bearing contact with the next adjacent section on opposite sides thereof only at the several separated points where said sections cross each other, and means for clamping said sections together.

10. A rheostat element comprising metallic sections piled in crosswise relation the one upon the other to form a space therethrough and therebetween, in combination with terminal plates associated with such pile, and means for clamping said sections and terminal plates together.

11. A rheostat element comprising metallic sections circular in cross-section piled the one upon the other in crosswise relation, terminal plates arranged at the ends of the pile of sections, and means for clamping said terminal plates and sections together.

12. A rheostat element comprising wire metallic sections piled the one upon the other in crosswise relation, a headed bolt extending through the pile of sections, and a clamp-nut mounted on the end of said bolt for clamping said sections in assembled relation between said nut and head.

13. A rheostat element comprising open metallic sections piled in crosswise relation the one upon the other, so as to form an enlarged open space at the middle, a headed bolt extending through the pile of assembled sections but out of contact therewith, a nut mounted upon said bolt for clamping said sections together, and insulating-washers interposed, respectively, between the pile of sections and the head of said bolt and said nut.

14. A rheostat element comprising metallic sections piled the one upon the other in crosswise relation, a headed bolt extending through the pile of assembled sections but out of contact therewith, the body portion of said bolt being free from insulation, a nut mounted upon the end of said bolt for clamp-

ing said sections between said nut and the head of said bolt, and terminal plates interposed, respectively, between said nut and the head of said bolt and the pile of assembled metallic sections.

15. A rheostat element comprising metallic sections piled the one upon the other in crosswise relation, a headed bolt extending through the pile of assembled sections but out of contact therewith, the body of the bolt being surrounded by an air-space, a nut mounted upon the end of said bolt for clamping said sections between said nut and the head of said bolt, terminal plates interposed, respectively, between said nut and the head of said bolt and the pile of assembled metallic sections, and means for insulating said terminal plates from said bolt.

16. A rheostat element comprising metallic sections piled the one upon the other in crosswise relation, a headed bolt extending through the pile of assembled sections but out of contact therewith, the body of the bolt being free from insulating material but surrounded by an air-space, a nut mounted upon the end of said bolt for clamping said sections between said nut and the head of said bolt, terminal plates interposed, respectively, between said nut and the head of said bolt and the pile of assembled metallic sections, and insulating means for centering said terminal plates with respect to said bolt.

17. In a rheostat element, a bolt threaded at one end and provided with a head at the other end, metallic sections strung over said bolt and piled the one upon the other in crosswise relation, said metallic sections each having a plurality of separated points of contact with the adjacent sections and a nut mounted upon the threaded end of said bolt to clamp or hold the pile of assembled sections between the same and the head of said bolt.

18. In a rheostat element, a bolt threaded at one end and provided with a head at the other end, metallic sections strung over said bolt and piled the one upon the other in crosswise relation, said metallic sections each having a plurality of separated points of contact with the adjacent sections, a nut mounted upon the threaded end of said bolt to clamp or hold the pile of assembled sections between the same and the head of said bolt, and insulating-washers interposed between said nut and head, respectively, and the pile of assembled sections.

19. A rheostat comprising one or more elements, each element including a bolt, metallic sections consisting of wires bent so as to form each section with an enlarged central opening piled the one upon the other in crosswise relation and supported by said bolt, a supporting-casing, and means for clamping said bolt to said casing.

20. A rheostat comprising one or more elements, each element including a bolt, a pile

of metallic sections consisting of wires bent so as to form each section with an enlarged central opening superposed in crosswise relation the one upon the other and strung upon said bolt, terminal plates, a supporting-casing, and means for clamping said plates to said casing.

21. A rheostat comprising one or more elements, each element including a bolt, a pile of metallic sections superposed in crosswise relation the one upon the other and strung upon said bolt, terminal plates, a support-

ing-casing, means for clamping said plates to said casing, and circuit-terminal studs in electrical connection with the terminal plates at opposite ends, respectively, of said elements. 15

In witness whereof I have hereunto set my hand this 2d day of December, 1904, in the presence of the subscribing witnesses.

EDMUND C. MORGAN.

Witnesses:

E. C. SEMPLE,

S. E. DARBY.