(No Model.) 2 Sheets—Sheet 1.

W. D. PACKARD.

HAND REGULATOR FOR ELECTRIC MOTORS.

No. 511,157. Patented Dec. 19, 1893.

Fig. 2.

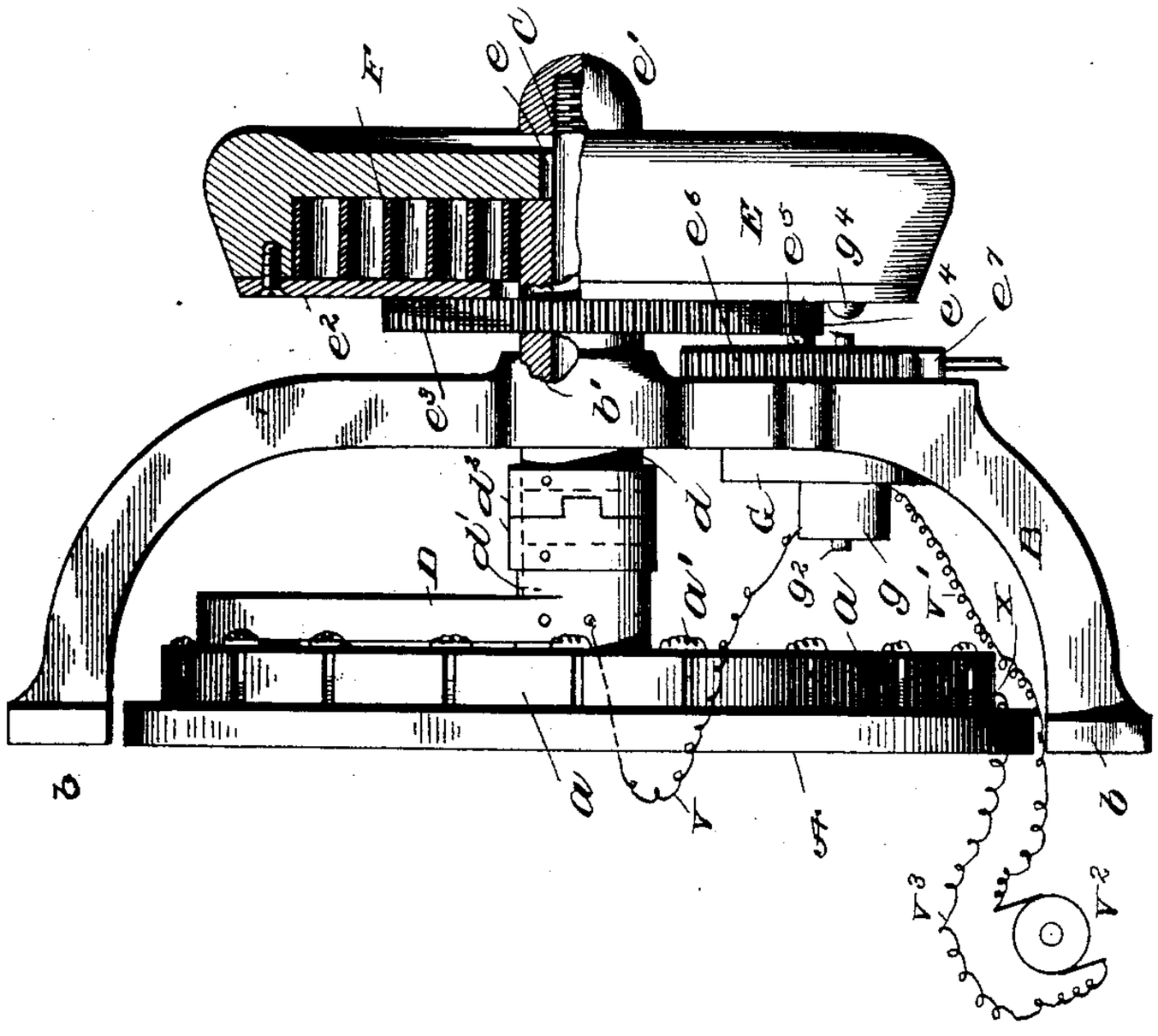
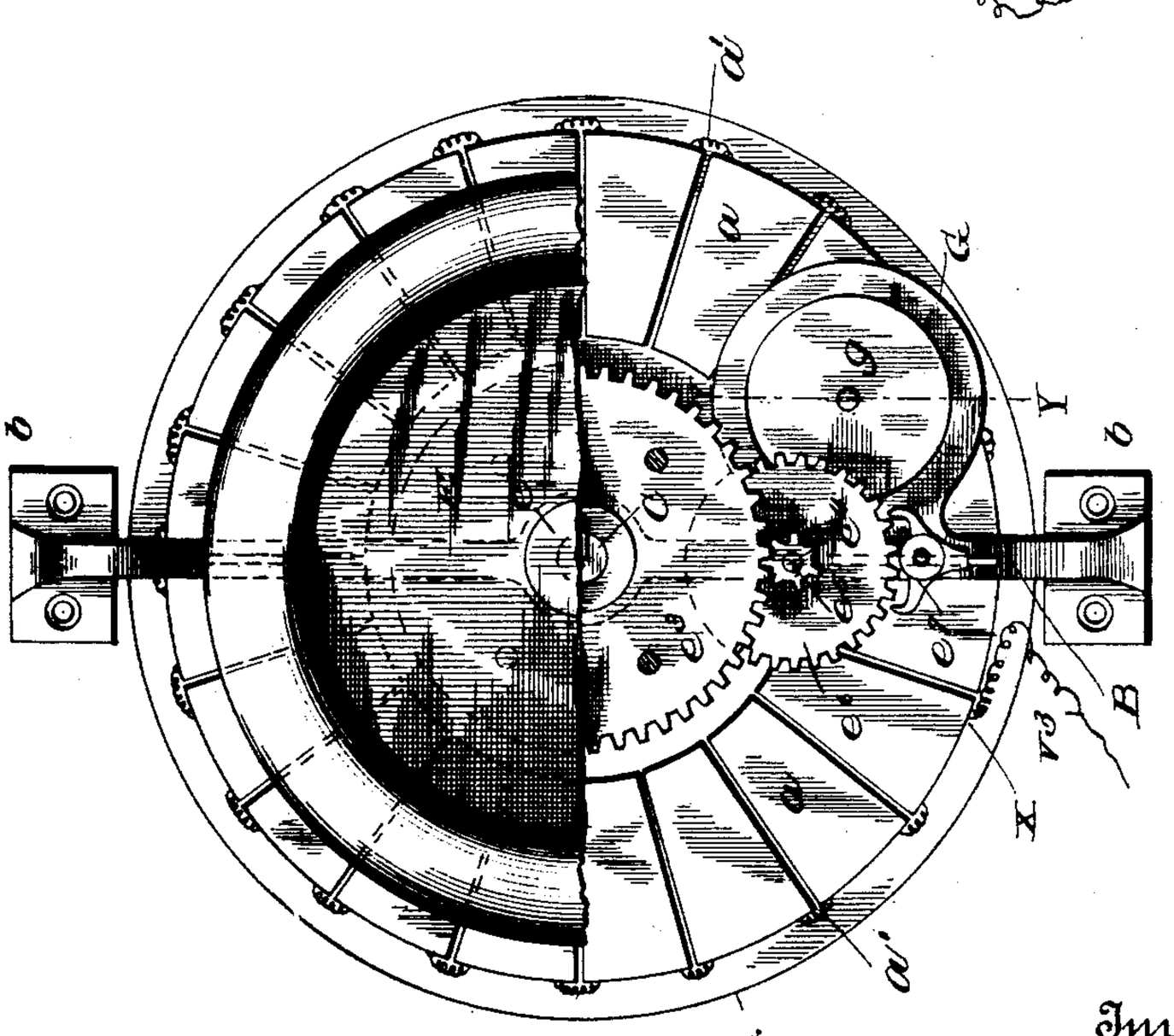


Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

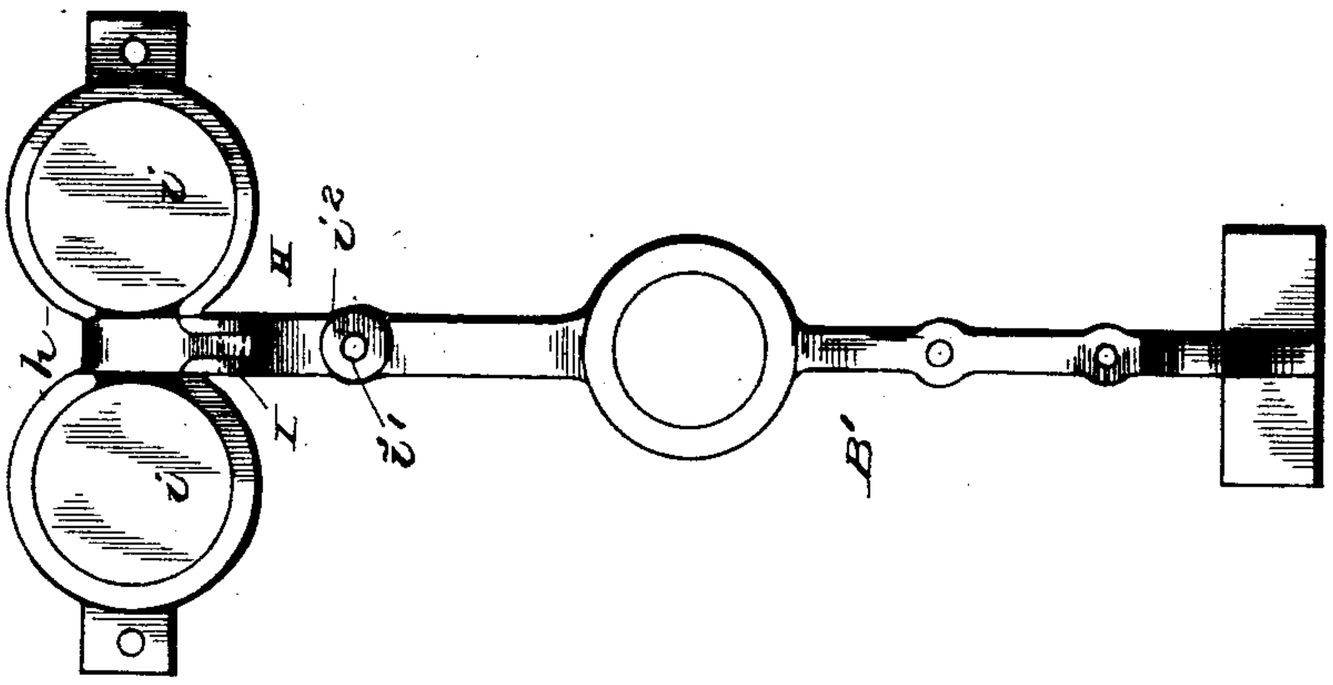
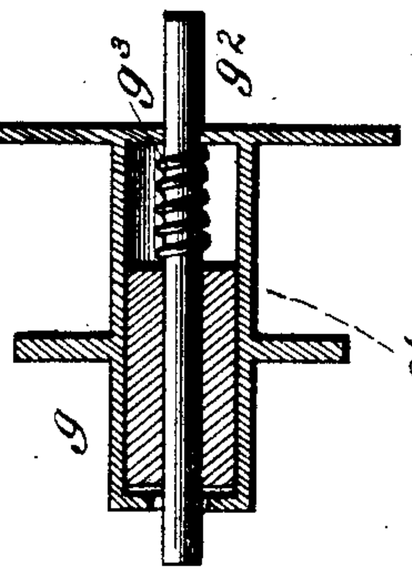


Fig. 4.

Fig. 3.



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WILLIAM D. PACKARD, OF WARREN, OHIO.

HAND-REGULATOR FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 511,157, dated December 19, 1893.

Application filed December 8, 1892. Serial No. 454,469. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. PACKARD, of Warren, in the county of Trumbull and State of Ohio, have invented certain new and useful Improvements in Rheostats; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention contemplates certain new and useful improvements in rheostats, and has for its object to provide simple and highly efficient means for effecting the gradual closing or opening of the current and in case of accident to provide for slowly letting off the current.

The invention consists in providing a rheostat with clock-like mechanism for controlling the operation of the switch arm, a spring impelled wheel and an electrically operated stop for limiting the movement of said wheel.

The invention also comprises the detail construction, combination and arrangement of parts, substantially as hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—Figure 1 is a front face view with parts broken away. Fig. 2 is a vertical sectional view on the line *x*—*x*, Fig. 1. Fig. 3 is a vertical sectional view on the line *y*—*y*, Fig. 1. Fig. 4 is a view in side elevation, with parts broken away, showing a slight modification. Fig. 5 is a face view of the form of frame employed in connection with this modification.

Referring to the drawings, A designates the face-board of my rheostat, and *a* a series of contact plates circularly or otherwise arranged on said face-board and connected together by resistance wires *a'*, preferably of German silver.

B is a supporting frame curved at its ends and having plates *b* through which screws are passed for holding it to the rheostat proper. The main portion of this frame stands out from and is parallel with the face of the rheostat, and at its center is formed a boss or shoulder *b'* through which extends a central opening for the passage of shaft C. Upon the inner end of this shaft is rigidly secured an arm D having an outer thickened end designed to be in contact with the plates *a*. This shaft is formed in two parts or sections *d*, *d'*, and it is to the latter that arm D is secured. These sections are united together by collars d^2 made of non-conducting material. One of said collars has a groove corresponding to a tongue of the other collar. By this means the electric current is kept out of the forward mechanism.

E is a balance wheel encircling the boss or shoulder *b'* and held fast to shaft C by a key *e* and a cap *e'* screwed on the threaded end of said shaft. This wheel is made hollow and to its inner face is secured a plate e^2 to which is connected a large gear-wheel e^3, having the same axis as wheel E. This gear-wheel meshes with a pinion e^4 on a stud e^5 supported by frame B, and upon said stud is a gear-wheel e^6 with which engages the rocking lever e^7 of an ordinary clock escapement. Within wheel E is a coiled spring F, the inner end of which is connected to the boss *b'* and its outer end to the inner periphery of the wheel. This spring effects the revolution of wheel E and the movement of the train of gearing, the latter being controlled by the escapement and thus rendered regular and uniform in its movement. It is obvious that a weighted cord, or other means, can be employed for revolving wheel E.

The next important feature of my invention consists in providing means to retain the spring wound up and allow the same to automatically unwind when the current is taken off, either by design or accident. This may be accomplished in many ways, the two preferred forms of which I will now describe.

In a ring or circular extension G of frame B is a solenoid *g*. See Fig. 3. This solenoid comprises the coil *g'* and a horizontally arranged bar g^2 which is normally held retracted by a coil-spring g^3. When the current is established said bar is made to project out into the line or path of a stud or shoulder g^4 extending from the rear face of wheel E, and hold said wheel in place and prevent the unwinding of the spring F. One end of the wire comprising the solenoid is connected by a wire V with the inner end of shaft C, said wire being passed through a central hole in the rheostat. The other end of the solenoid wire is connected to a wire V', of a dynamo, (indicated by lines V^2) while the other wire V^3 of

said dynamo, is connected to one of the contact plates *a*, say at X, thus making a connection in series. Or the connection may be made in shunt by connecting one of the wires from the solenoid with the wire from the dynamo which is attached to the shaft, and the other wire from the solenoid is attached to the second wire from the dynamo which latter is attached to the face of the rheostat, as before set forth.

The second preferred form for effecting the holding of the wheel E is shown in Figs. 4 and 5. In this form the frame B′ is provided at its upper end with two corresponding rings or circular casings *h* in which fit the parts of a magnet H, such as used by telegraphers. A lever I is fulcrumed in an opening in frame B′, and to its upper end is secured a bar *i* opposite the end of the magnet, while to the lower end of said lever is pivotally connected one end of a bar or rod *i′* which is extended through a hollow boss i^2 of frame B′. The bar *i* is under the control of magnet H and when it is in contact with the latter the bar or rod *i′* is projected outward into the line or path of the stud or projection of wheel E, and thus acts as a stop therefor. The wires connecting with the magnets may be arranged similarly to the wires for the solenoid, before described, that is, in shunt or in series.

The operation of my invention is as follows:—Suppose the sweep arm to be in contact with plate *a* to the left of the plate to which wire V^3 is connected. The revolution of wheel E being started, the current enters the end of shaft C and passes through the sweep arm to the contact plate and from plate to plate by the wires *a′* until the sweep arm reaches the plate to which said wire of the dynamo is connected, when the current passes off at that point. Thus the resistance wires act as blocks to let the current on gradually. Without controlling mechanism the operator is liable to turn the sweep-arm too rapidly, whereas the clock-like mechanism herein-described compels him to turn the current on or off slowly, and in case of accident said mechanism will let the current off gradually.

The advantages of my invention are apparent to those skilled in the art to which it appertains, and it will be specially observed that the means I employ for securing the results stated are exceedingly simple and add but little to the cost, and the addition of my improvements insures the accurate and perfect working of the rheostat.

I claim as my invention—

1. In a rheostat, a frame extending across the face thereof, a shaft mounted in said frame, a sweep arm on the inner end of said shaft, and a spring-impelled balance-wheel fast on the outer end of said shaft, substantially as set forth.

2. In a rheostat, a frame extending across the face thereof, a shaft mounted in said frame, a sweep arm on the inner end of said shaft, a spring-impelled balance-wheel fast on the outer end of said shaft, and clock-like mechanism for controlling the movement of said wheel, substantially as set forth.

3. In a rheostat, a frame extending across the face thereof, a shaft mounted in said frame, a sweep-arm on the inner end of said shaft, a spring-impelled balance-wheel on the outer end of said shaft, and an electrically operated stop for engaging and holding said wheel, substantially as set forth.

4. In a rheostat, a frame extending across the face thereof having a central boss or shoulder, a shaft mounted therein, a sweep arm on the inner end of said shaft, a hollow wheel fast on said shaft, a spring located in said wheel and having one end connected thereto, its other end being connected to said boss or shoulder, the plate inclosing the inner side of said wheel, the gear wheel attached to said plate, and the clock-like mechanism in engagement with said gear wheel, substantially as set forth.

5. The herein-described improved rheostat, comprising the frame, the shaft supported thereby formed in two sections, non-conducting collars on said sections having interlocking portions, and means for moving said shaft, substantially as set forth.

6. In a rheostat, a frame extending across the face thereof having a central boss and a ring or circular extension, a shaft mounted in said boss, a sweep arm on the inner end of said shaft, a spring-impelled wheel fast on the outer end of said shaft having a stud or shoulder g^4, a magnet or its equivalent located in said ring or extension, and a bar or rod operated thereby and designed to be engaged by said stud or shoulder, substantially as set forth.

7. The herein-described improved rheostat, comprising the frame, having a central hollow boss, the shaft supported by said boss and composed of two sections, the non-conducting collars uniting said sections, the sweep arm carried by one of said sections, the wheel keyed on said shaft, the spring secured to said boss and to said wheel, the described train of gearing, the escapement lever, the magnet, the described connection between the latter and said shaft and between a dynamo and said magnet and face or rheostat, and means for automatically holding said wheel, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM D. PACKARD.

Witnesses:
T. H. THOMAS,
GEO. W. UPTON.