(No Model.)

E. WESTON.

REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 316,089. Patented Apr. 21, 1885.

Fig. 1.

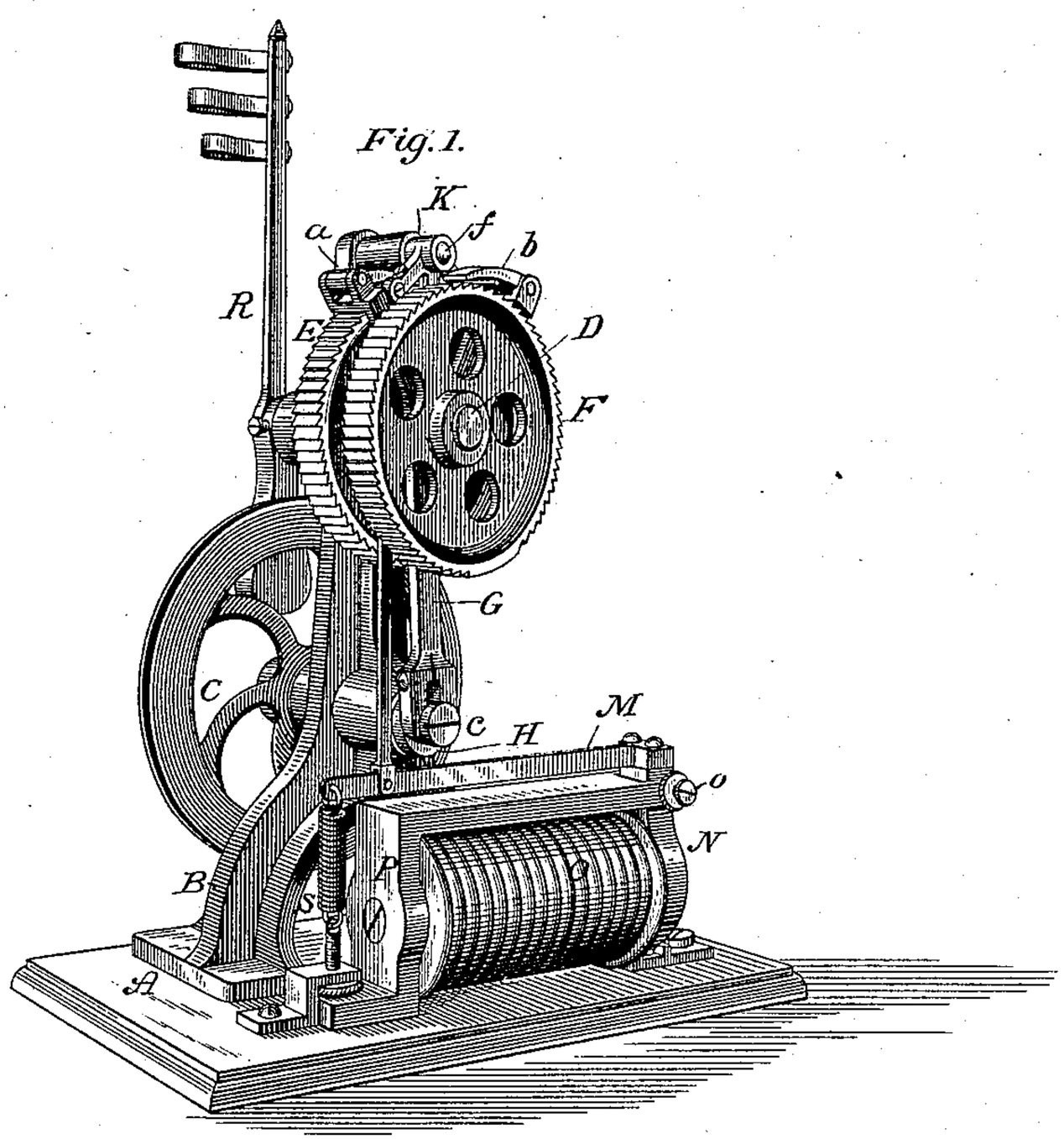
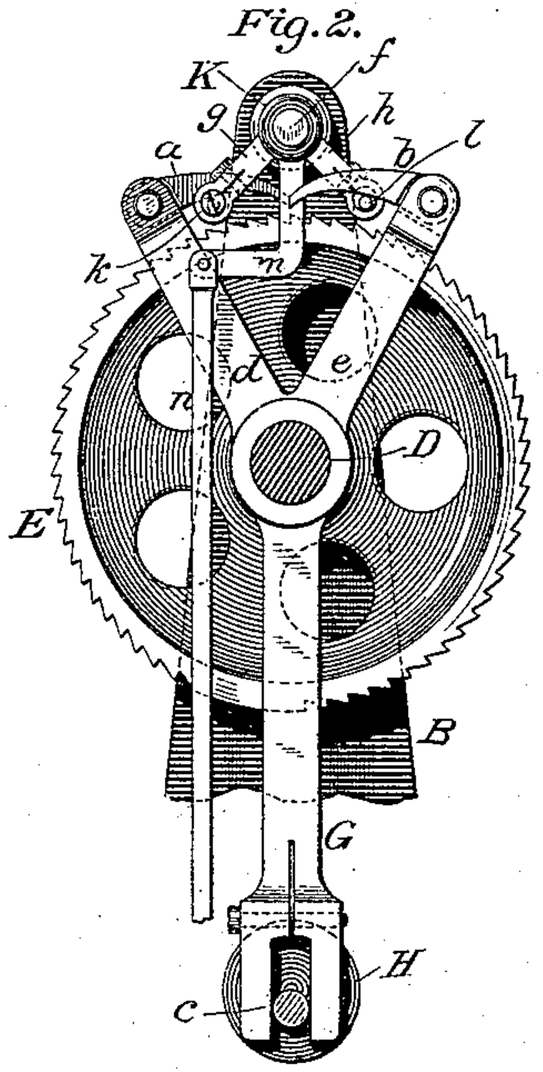


Fig. 2.



Attest:

Raymond F. Barnes.
W. Frisby

Inventor:

Edward Weston
By Parker W. Page
Atty.

UNITED STATES PATENT OFFICE.

EDWARD WESTON, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE UNITED STATES ELECTRIC LIGHTING COMPANY, OF NEW YORK, N. Y.

REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 316,089, dated April 21, 1885.

Application filed February 12, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WESTON, a subject of the Queen of Great Britain, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Regulators for Dynamo-Electric Machines, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

When the resistance of an electric circuit is to be varied by means of a rheostat operated by an electro-magnet, it is usual to employ some mechanism for imparting the requisite movement to the rheostat, using the electro-magnet only for determining the direction and duration of the movement. By arrangements of this character the magnet is largely relieved of its load, and greater sensitiveness thereby secured, while the employment of rheostats of unlimited range is rendered possible.

In a patent granted to me May 29, 1883, No. 278,640, I have shown and described a system of regulation involving a mechanism operating on this principle. The contact-arm that sweeps over the plates of the rheostat is moved in one direction or another by the action of oscillating pawls that receive motion from a shaft constantly rotated by some suitable source of power. An electro-magnet is employed for controlling the position of the pawls with reference to a pair of ratchet-wheels, and thus determines in what direction or how far the contact-arm shall be turned.

My present invention is an improvement in this class of instruments, the invention having for its object to render the action of the regulating mechanism more sensitive and sure, and to simplify the construction and arrangement of the parts.

The parts of the regulating mechanism to which my invention is confined are illustrated in the accompanying drawings.

Figure 1 is a perspective of the devices for turning the contact-arm of a rheostat; Fig. 2, an enlarged view in elevation and part section of parts of the same.

The working parts are mounted on any suitable base, A, and are composed in the main of the means for shifting the rheostat-arm and the electro-magnetic regulating devices. The former are supported by a metallic standard, B, and consist of a pulley-wheel, C, a shaft, D, carrying two ratchet-wheels, E F, and a bifurcated bar, G, carrying the hinged pawls *a b*, and oscillated on the shaft D by a crank-pin, *c*, on the disk H, fixed to the shaft of the pulley-wheel. The position of the bar G is between the two ratchet-wheels, whereby an accurate balance and increased delicacy of operation of the parts is attained. One branch, *d*, is bent at right angles, and to it is hinged the pawl *a* over the wheel E. The other branch, *e*, is similarly bent, and holds the pawl *b* over the wheel F, both pawls being between the branches *d e*, so that by the oscillation of the bar G the ratchet-wheels will be turned in opposite directions by the engagement of their respective pawls. A sleeve, K, on a pin, *f*, set in the standard B, is provided with two arms, *g h*, from which extend pins *k l* in opposite directions, and under the pawls *a b*, respectively. The pins *k l* are shown as being adjustable in the arms *g h*, toward or from the circumference of the ratchet-wheels, to admit of an accurate regulation of the engagement of the pawls with said wheels. This adjustability is preferably attained, as shown, by making that part of the pins *k l* which supports the pawls eccentric to the part which has a bearing in the arms *g h*. By turning said pins, therefore, in the arms *g h*, the parts which operate the pawls will be moved to different positions between said pawls and the wheels nearer to or farther from the wheels, as desired. A third arm, *m*, bent at right angles, extends from sleeve K down between the two ratchet-wheels, and is connected by a rod, *n*, with an arm, M, secured to an armature, N, pivoted at *o* to a rigid frame, P, supporting an electro-magnet O. The contact-arm R, of any ordinary form of rheostat which has a circular series of contact-plates, is fixed to the end of shaft D, and by the movement of the latter is caused to sweep over the said plates, and thus interpose or cut out a greater or less amount of resistance. The rheostat or series of coils, not entering into the present invention, and its character and use being clearly understood, is not shown in the drawings.

The operation of the device is as follows: The coils of magnet O are connected up in any given circuit, the current in which is to be utilized for operating or controlling the

rheostat by shifting the contact-arm R. The pulley-wheel C is rotated by any desired source of power—an electric motor or the engine used for running the generators which produce the current. This imparts to the bar G an oscillating motion on the shaft D and moves the pawls *a b* to and fro over the ratchet-wheels E F. When the normal current is passing in the coils of magnet O, the attraction of the magnet for its armature, counterbalanced by the adjustable spiral spring S, holds the arms *g h* in a position where both pawls *a b* are held out of contact with the ratchet-wheels by the pins *k l*. Should the current in magnet O increase, its power becomes greater and rod *n* is raised. This turns the sleeve K, and lowers the pawl *b* into engagement with the teeth of wheel F. The latter is therefore turned step by step, shifting the arm R. The same takes place with the pawl *a* and wheel E when the current in magnet O falls below the normal.

In practice I apply this device to the regulation of a dynamo-electric machine, as set forth in my patent above referred to—that is, I connect up the magnet O in the main circuit, and operate or control by it a variable resistance in the derived field-circuit of the machine.

The combination of devices herein described may, however, be applied to many other purposes—such as a regulation of the flow of water, gas, or any fluids—but such other uses are more fully set forth in other applications of which they are to be made the subject.

The construction and arrangement of the parts comprising the device which I have now described possess many advantages and features of novelty.

Aside from its extreme simplicity, the arrangement of parts secures a movement of the pawls with respect to the ratchet-wheels such that, while their full force and effect are availed of, their disengagement with the ratchet is greatly facilitated. The delicacy and sensitiveness are also greatly increased by the fact that the only load on the magnet is the weight of the pawls, while the free action or movement of the armature is not and cannot be impeded by the engagement of the pawls with the ratchets, since, while a pawl is in action, the pin *k* or *l* which projects under it is out of contact with it.

Having now described my invention, what I claim is—

1. In a regulating mechanism, the combination of a shaft, two oppositely-toothed ratchet-wheels thereon, a bar pivoted on the shaft, situated between the wheels, and carrying on each side and above each wheel a pawl adapted to engage therewith, means for oscillating said bar, an electro-magnet and armature, and mechanism controlled thereby for lowering the pawls alternately into engagement with the ratchet-wheels, substantially as set forth.

2. In a regulating mechanism, the combination, with a shaft and the ratchet-wheels carried thereby, of a pivoted bar, pawls supported thereon, means for oscillating the bar, pivoted arms extending beneath the pawls, an electro-magnet and hinged armature, the bar M, attached to the armature and parallel to the magnet, the spring S, secured to the bar M and acting to oppose the force of the magnet, and the rod *n*, connecting the bar M with the said pivoted arm, substantially as set forth.

3. In a regulating mechanism, the combination, with a shaft and the ratchet-wheels carried thereby, of the pawls, devices for actuating them, arms *g h*, pins supported in said arms extending beneath the pawls, and adjustable to various positions between the pawls and ratchet-wheels, an electro-magnet and armature, and mechanism controlled by the movement of the armature for adjusting the arms *g h*, substantially as set forth.

4. In a regulating mechanism, the combination, with a shaft and the ratchet-wheels carried thereby, of the pawls, devices for actuating them, arms *g h*, eccentric pins *k l*, supported in said arms and extending beneath the pawls, an electro-magnet and armature, and mechanism controlled by the movement of the armature for adjusting the arms *g h*, substantially as set forth.

In testimony whereof I have hereunto set my hand this 30th day of January, 1884.

EDWARD WESTON.

Witnesses:
W. H. HARTLEY,
W. FRISBY.