No. 674,942. Patented May 28, 1901.

S. D. SPRONG.

AUTOMATIC CURRENT REGULATOR.

(No Model.) (Application filed Mar. 16, 1901.) 2 Sheets—Sheet 1.

Fig. 1.

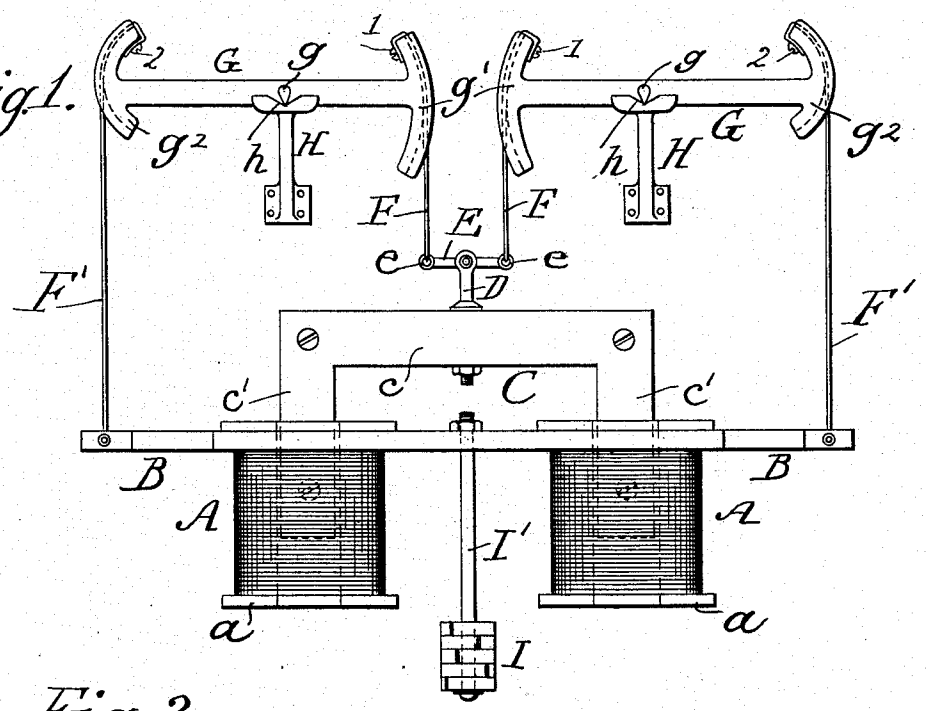
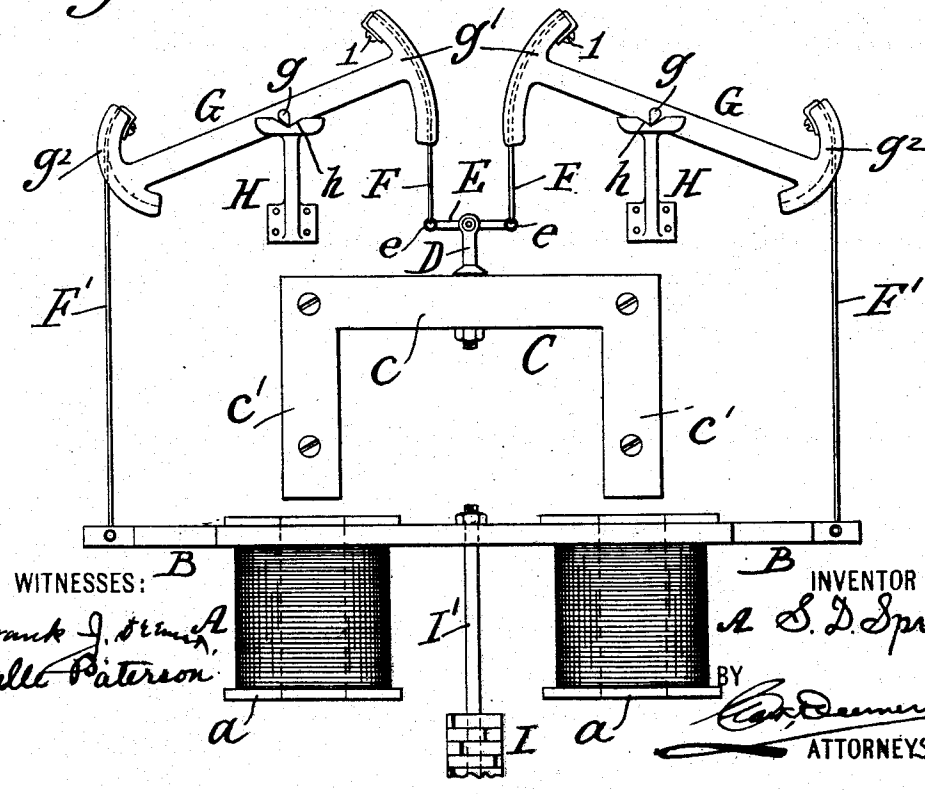


Fig. 2.



WITNESSES:

Frank J. Strauss

Belle Paterson

INVENTOR

S. D. Sprong

BY

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 674,942. Patented May 28, 1901.

S. D. SPRONG.

AUTOMATIC CURRENT REGULATOR.

(Application filed Mar. 16, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

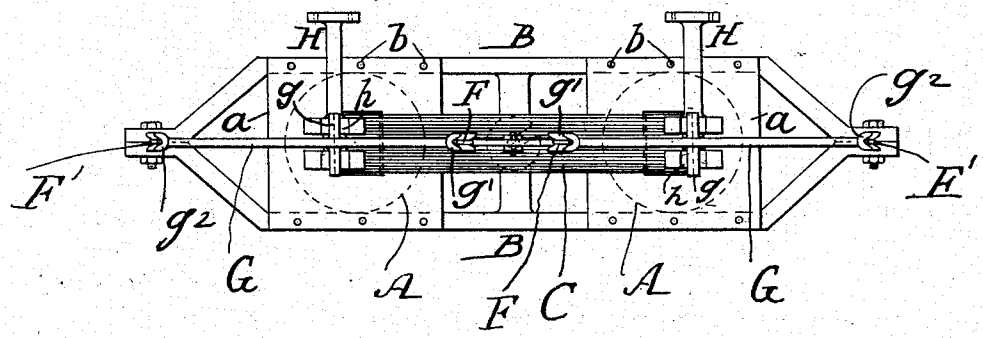


Fig. 4.

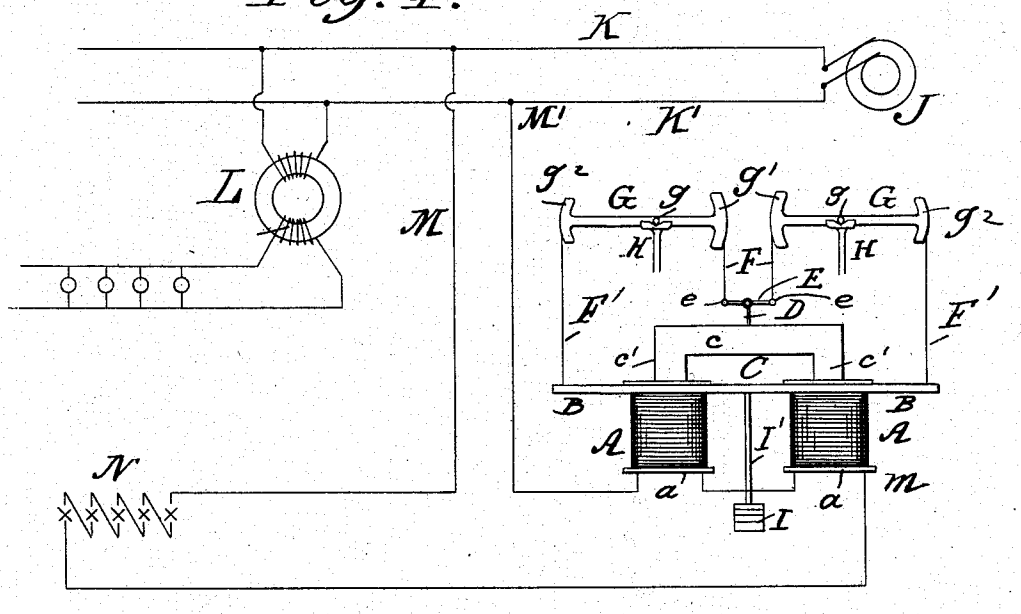
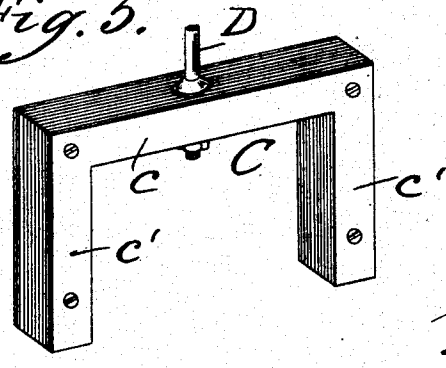


Fig. 5.



WITNESSES:

Frank J. Sterne

Belle Paterson.

INVENTOR

S. D. Sprong

BY

Cox & Sterne

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SEVERN D. SPRONG, OF LONGBRANCH, NEW JERSEY, ASSIGNOR OF ONE-HALF TO JAMES H. HARNDEN, OF BROOKLYN, NEW YORK.

AUTOMATIC CURRENT-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 674,942, dated May 28, 1901.

Application filed March 16, 1901. Serial No. 51,486. (No model.)

To all whom it may concern:

Be it known that I, SEVERN D. SPRONG, a citizen of the United States, and a resident of Longbranch, county of Monmouth, and State of New Jersey, have invented certain new and useful Improvements in Automatic Current-Regulators, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof, in which similar characters of reference indicate corresponding parts.

This invention relates to automatic current-regulators, the object thereof being to supply an inexpensive, compact, and readily-operative device which is adapted to maintain a constant current in an alternating-current circuit irrespective (within certain limits) of the pressure of supply or the pressure required in the circuit of the regulator to operate the lamps or other devices. It is designed, primarily, to supply arc and incandescent lamps in series and requiring for the circuit a variable voltage, but a constant current (within, say, one-tenth ampere) taking its supply from constant-potential mains.

The invention will be hereinafter fully described, and specifically set forth in the annexed claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a front elevation of my improved regulator, showing the parts in normal balanced relative arrangement. Fig. 2 is a similar view showing the parts in different relative arrangement; Fig. 3, a plan view. Fig. 4 is a diagrammatic view illustrating the circuits, and Fig. 5 is a perspective view of the laminated core forming part of the device.

In the practice of my invention I employ, primarily, a solenoid comprising a pair of coils A A, composed of insulated copper wire wound in suitable form upon spools *a*, which are preferably squared, as illustrated in the drawings. These coils are secured to a supporting-frame B by means of screws or other suitable fastenings, as *b*. In conjunction with the said coils A, I employ an approximately U-shaped laminated iron core C, which embodies the horizontal portion *c* and the vertical extensions *c'*, which are adapted to move vertically within the openings of the coils A. The said core C is laminated in the direction of its length, as clearly shown by Fig. 5 of the drawings.

The core C is supplied with a centrally-located vertical rod D, which is connected at its upper end to the central part of a horizontal bar E, having end eyes *e* engaging suspending-cords F, which are connected to the swinging supporting-beams G. In lieu of the said cords I may use chains, ribbon, or tape, if found desirable.

The swinging beams G respectively embody a knife-edged supporting-spindle *g*, extended therethrough, a peripherally-grooved segment *g'*, and a peripherally-grooved segment g^2. The said beams are supported on suitable brackets, as H, the knife-edges of the spindles engaging the shallow notches *h*, whereby the beams are respectively fulcrumed from the point of the knife-edge of the spindle in such a manner as to minimize friction during the operation of oscillating them.

The upper portions of the tapes or cords F engage the grooves of the segments *g'*, and they are securely fastened to the segments at their upper ends by means of the screws 1, or any other suitable fastening may be employed. As a means for suspending the frame B and its connected coils A A a tape, cord, or other suitable similar device F' is attached to each grooved segment g^2 at its upper end by means of the screws 2, the lower ends of said cords being secured to the frame B at each end thereof.

As a means for differentially balancing the parts I employ a plurality of removable weights I, which are supported on a rod I', which is extended downwardly from the central portion of the frame B.

The segments *g'* are concentric with the fulcrum-points of the knife-edged spindles *g*, but the segments g^3 form parts of smaller circles. The object of this difference is that uniformity of the effective weight of the core C relatively with the fulcrum-points be maintained during all movements of the levers and that the effective weight of the coils A A shall be maximum when the levers are horizontal, as shown by Fig. 1 of the drawings, and minimum when the core C is entirely out of the coils, as shown by Fig. 2, or when the said core is entirely in the coils. The reason for

this variation is that the pulling action of the coils A A on the core C is maximum when the core is half-way in the coils and minimum when the core is just entering or when it is fully in, thus affording efficient means to balance the weight of the coils A A and such additional weight as may be carried on the rod I' against the weight and varying magnetic pull of the core C.

Referring to Fig. 4 of the drawings, J represents an alternating-current generator, K and K' distributing-mains therefrom, and L an example of ordinary multiple lighting. M represents a line leading off from distributing-main K to circuit of arc-lamps N, then through regulator-coils at *m*, and then back to mains at M', all of said parts being in series.

In the operation of the invention the work of the regulator is to cut down by an automatically-adjusted reactance the surplus voltage of the circuit—that is, supposing the supply is two thousand and each of ten lamps takes eighty volts, or a total of eight hundred, this leaves twelve hundred volts to be cut down by the regulator, which is effected by the more or less reactance in the regulator-coils as the core is entered more or less. For instance, the circuit requires seven and one-half amperes, which must remain practically constant irrespective of the number of lamps thrown on or off. Then the weight of the core C added to the pull of seven and one-half amperes just balances the weight of the coils A A. Suppose some of the lamps are thrown off. Then the current tends to increase; but the added pull of this increase of current disturbs the balance and causes the core C to further enter the coils A A, which increases the reactance and cuts down the current to seven and one-half amperes, when it is again in balance. Obviously when the core enters the coils the action is effected by mutual movement of the core and coils, each traveling part way or approaching each other, owing to the arrangement of the levers supporting the said parts.

I am aware that it is not broadly new to govern alternating circuits by reactance or by a coil and core, and therefore I do not lay claim to the idea broadly. The novelty of my invention is that the parts are mutually and automatically balanced against each other, their varying mutual pull being compensated for by the novel arrangement of the beams or by so varying the effective distance of the suspending-cords correlatively with each other and with the fulcrums of the beams and the removable weights for adjusting the device to suit different amounts of current.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with an electric generator, of an electromagnet and other electrically-actuated devices arranged in circuit, balanced beams connected respectively at one end to the coils of the electromagnet and at the other end to the core thereof, whereby the parts are mutually and automatically balanced, substantially as shown and described.

2. In an automatic current-regulator, an oscillating balanced beam mechanism actuated by an electric current to automatically regulate said current, in combination with an electromagnet having its coil suspended from and supported by the outer ends of the beams of said beam mechanism and its core suspended from and supported by the opposite ends of said beams, whereby the parts are mutually and automatically balanced, substantially as shown and described.

3. In a regulator for maintaining a constant current in an alternating-current circuit, a solenoid, in combination with oppositely-located oscillating beams supporting the coils of the solenoid from their outer ends and the core thereof from their inner ends, substantially as shown and described.

4. In an automatic current-regulator, a pair of oscillating balanced beams actuated by an electric current to automatically regulate said current, in combination with a solenoid and means suspending the solenoid from the said beams, the coils of said solenoid supported by the outer ends of the said beams and the core from the inner ends of said beams, whereby the parts are mutually and automatically balanced, substantially as shown and described.

5. The combination, with an electric generator, of a solenoid and other electrically-actuated devices arranged in circuit, two oppositely-located oscillating beams having grooved segments on their respective ends, and arranged to support the solenoid, and suspending means connecting the outer segments of the beams to the coils of the solenoid, and similar means connecting the core of the solenoid to the inner segments of said beams, whereby the parts are mutually and automatically balanced, substantially as shown and described.

6. The combination, with an electric generator, of a solenoid and other electrically-actuated devices arranged in circuit, two oppositely-located balanced beams supplied respectively with an inner grooved segment which is peripherally concentric with the beam-fulcrum and an outer grooved segment forming part of a smaller circle, suspending means connecting the said outer segments to the coils of the solenoid and suspending means connecting the said inner segments to the core of said solenoid, whereby the parts are mutually and automatically balanced, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 4th day of March, 1901.

SEVERN D. SPRONG.

Witnesses:
RUSSELL BARCHERS,
H. C. RICHARDSON.