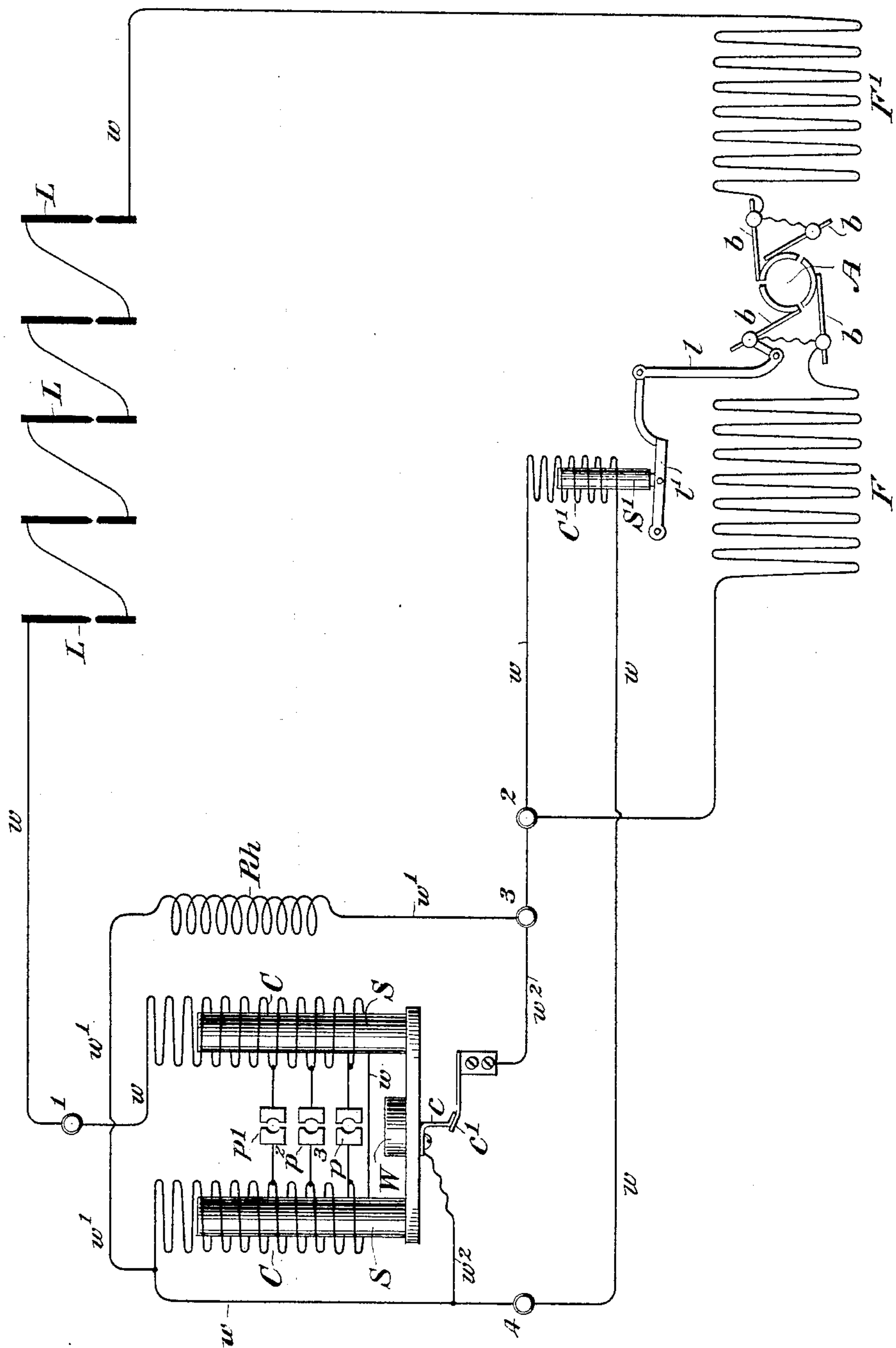


(No Model.)

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METHOD OF ELECTRICAL REGULATION.

No. 480,393.

Patented Aug. 9, 1892.



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# UNITED STATES PATENT OFFICE.

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## METHOD OF ELECTRICAL REGULATION.

SPECIFICATION forming part of Letters Patent No. 480,393, dated August 9, 1892.

Application filed February 23, 1892. Serial No. 422,535. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY E. VINEING, a citizen of the United States, residing at Roseville, in the county of Essex and State of New Jersey, have made a new and useful invention in the art of Electric Regulation, of which the following is a specification.

My invention is directed particularly to a novel method of and apparatus for regulating the quantity of electric current to be utilized in connection with a system of electric lighting, electric motors, or kindred translating devices within certain limits—that is to say, my invention consists in the novel method of and apparatus for varying the supply of current used between certain limits, within which limits only the electric translating devices are adapted to work effectually.

It is a well-known fact that certain types of electric translating devices—as, for instance, certain forms of electric-arc lamps—are adapted to work effectually between certain limits of current-supply under a definite voltage or electro-motive force—as, for instance, the well-known form of Thomson & Houston arc lamps are adapted to work equally well, in so far as their operation is concerned, with from seven (7) to ten (10) ampères of current generated under a given electro-motive force, dependent, of course, upon the number of such lamps in series, and that the only effect of any increase or decrease of current within the aforesaid limits is to proportionately increase or decrease the candle-power or illumination. In the use of electric-light plants, therefore, it is often advisable to utilize this variation in illuminating power with a corresponding saving of power at the generating-station—as, for instance, on moonlight nights the current-supply may be run at the lowest ebb, thereby using a minimum amount of power, while on exceedingly-dark nights the maximum current-supply could be utilized, using a maximum amount of power. I have therefore devised a regulator for taking advantage of this principle; and to this end it consists in the method of operation and the apparatus for practicing such method, as hereinafter described, but particularly pointed

out in the claims at the end of this specification.

My invention will be fully understood by referring to the accompanying drawing, which is a diagrammatic view of an arc-light plant embodying a generator, a regulator, and a supplemental regulator with my improvement attached.

I have illustrated the invention in connection with the well-known form of Thomson & Houston generator and regulator, with a “wall-controller” or supplemental regulator attached thereto.

Referring to the drawing in detail, L L L represent arc lamps in series connected with an exterior or working circuit  $w$  through a generator having field-magnets F F' and an armature A, the commutator-brushes  $b b$  being operatively connected through levers  $l l'$  with a solenoid-core S', surrounded by a coil C', located directly in the main circuit  $w$ .

S S represent solenoid-cores surrounded by coils C C, connected in series in the main circuit  $w$ .

$c c'$  are contacts, the former carried by the solenoid-cores S and the latter fixedly secured to a support and both connected to a shunt-circuit  $w^2$ .

R  $h$  is a rheostat or resistance-coil in a second shunt  $w'$  for the purpose of diminishing the spark when the contact-points  $c c'$  are separated.

W is a weight for giving to the solenoid-cores S a downward movement in opposition to the attraction of the coils C.

1, 2, 3, and 4 are binding-posts, to which the several circuits described are connected.

The apparatus so far described is well known in the art and is in substance described in Patent No. 271,948, granted February 6, 1883, to Elihu Thomson.

With the apparatus as so far described current-regulation is effected by the action of the brush-shifting solenoid C' upon the brushes  $b$ , the movement thereof being regulated by a dash-pot. (Not shown, but well understood in connection with regulators of this type). When the apparatus is in operation, the contact-points of the wall-controller or supplemental regulator are caused to dance



or vibrate and the supply of current to the regulating-solenoid  $C'$  is varied, as is fully described in the aforesaid patent.

My invention consists in applying to the  
 5 wall-controller or supplemental regulator a means for causing it to operate equally well for the varying quantities of current it is desired to utilize in the exterior or working circuit, and to this end I divide the coils of the  
 10 wall-controller or supplemental regulator into sections, as clearly shown, and provide contacting-plates or switches for cutting in or out more or less of the sections. Contacting-plates of this nature are shown at  $p'$   $p^2$   $p^3$ , connected to sections of the coils, the arrangement being such that when a conducting-  
 15 plug is inserted in position between any one of the pairs of contact-plates the effect of the solenoid  $C$  upon its cores  $S$  will remain constant for varying current-supplies in a manner at once apparent to those skilled in the art. In other words, suppose it is desired to operate the lamps  $L$  at their lowest capacity of, say, seven (7) ampères. Then the switch-  
 20 plug will be taken out and all of the sections of the coils  $C$  will be united in series, so as to give to the wall-controller its usual energizing effect. Suppose now it is desired to vary the current-supply to intermediate limits between  
 30 seven (7) and ten (10) ampères. For the first change the switch or plug would be inserted between the contact-plates  $p^3$ . For the second change it would be removed from the plates  $p^3$  and inserted between the plates  $p^2$ . For the  
 35 final change for, say, ten (10) ampères it would be inserted between the upper set of plates  $p'$ . It will thus be readily appreciated that by maintaining the magnetic effect of the wall-controller or supplemental regulator  $C$  constant for varying currents I am enabled to  
 40 correspondingly vary its effect upon the regulating magnet or solenoid  $C'$ , and hence to keep the current-supply in the exterior circuit in direct control within the limits named.  
 45 I am aware that electro-magnets have been heretofore devised with sectional coils and provided with means for varying the magnetic effect of the coils upon the armatures of the magnets and that such magnets have  
 50 been used in connection with telegraphs for regulating the pull of the armatures thereof in accordance with variations of current passing over the line, and I make no claim hereinafter broad enough to include such apparatus.  
 55 My invention is diametrically opposite in principle to that here disclaimed in that I propose by the utilization of such apparatus to vary

the current-supply over the line in the manner and for the purpose already described.

I do not limit myself to the application of 60 this principle directly to a wall-controller or supplemental regulator, as I may apply the same principle directly to the regulating-coils of the regulating-magnets thereof.

I have shown the apparatus as applicable 65 to a supplemental regulator for the reason that I find that with such a regulator I am enabled to obtain the best results. I wish it understood, therefore, that my claims hereinafter made are directed, broadly, to the appli- 70 cation of the generic principle of maintaining the magnetic effect of an electro-magnetic regulator constant in direct proportion to the quantity of current it is desired to use in the exterior or working circuit between the limits 75 for which the translating devices are adapted to work, and this without reference to any special kind or form of mechanism.

Having thus described my invention, what I desire to secure by Letters Patent of the 80 United States is—

1. A series of arc lights adapted to operate effectually between specified current-limits, a dynamo-electric machine in circuit therewith, a primary electro-magnetic regulator 85 therefor, and a supplemental electro-magnetic regulator provided with adjustable means in the nature of sectional coils for varying the current-supply which actuates the primary regulator, substantially as described. 90

2. One or more electric translating devices adapted to operate effectually between specified current-limits, a dynamo-electric machine in circuit therewith, and a primary electro-magnetic regulator, in combination with a sup- 95 plemental electro-magnetic regulator having sectional coils and means for throwing more or less of the coils into and out of circuit, whereby the current-supply may be maintained at a fixed quantity within the limits 100 specified, substantially as described.

3. Two or more electric lamps located in series with a dynamo-electric machine and adapted to work effectually between specified current-limits, a current-regulator for regu- 105 lating the supply of current to the lamps, and a supplemental regulator provided with sectional coils, and means for varying the number of such coils in circuit, substantially as described.

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