

No. 684,166.

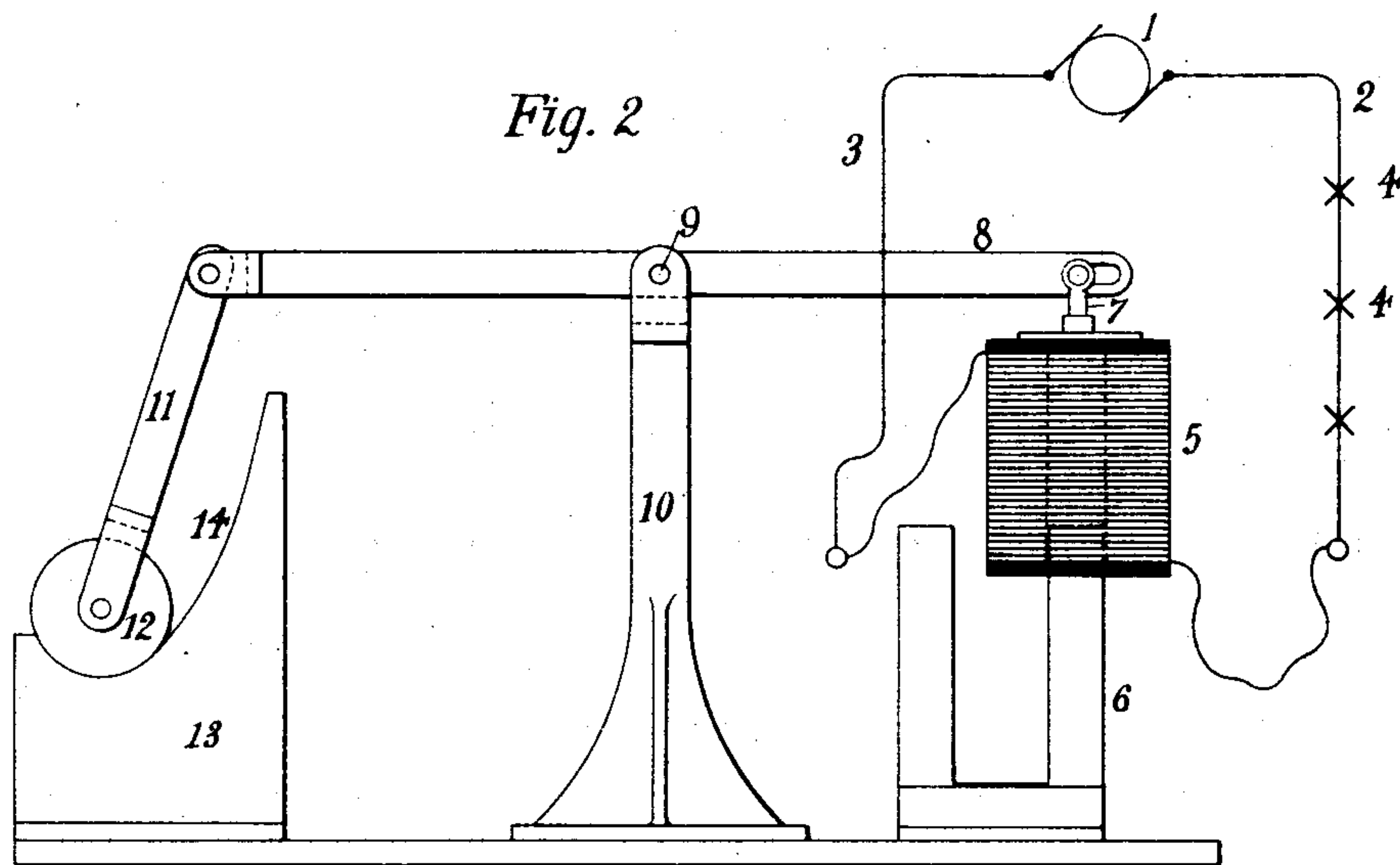
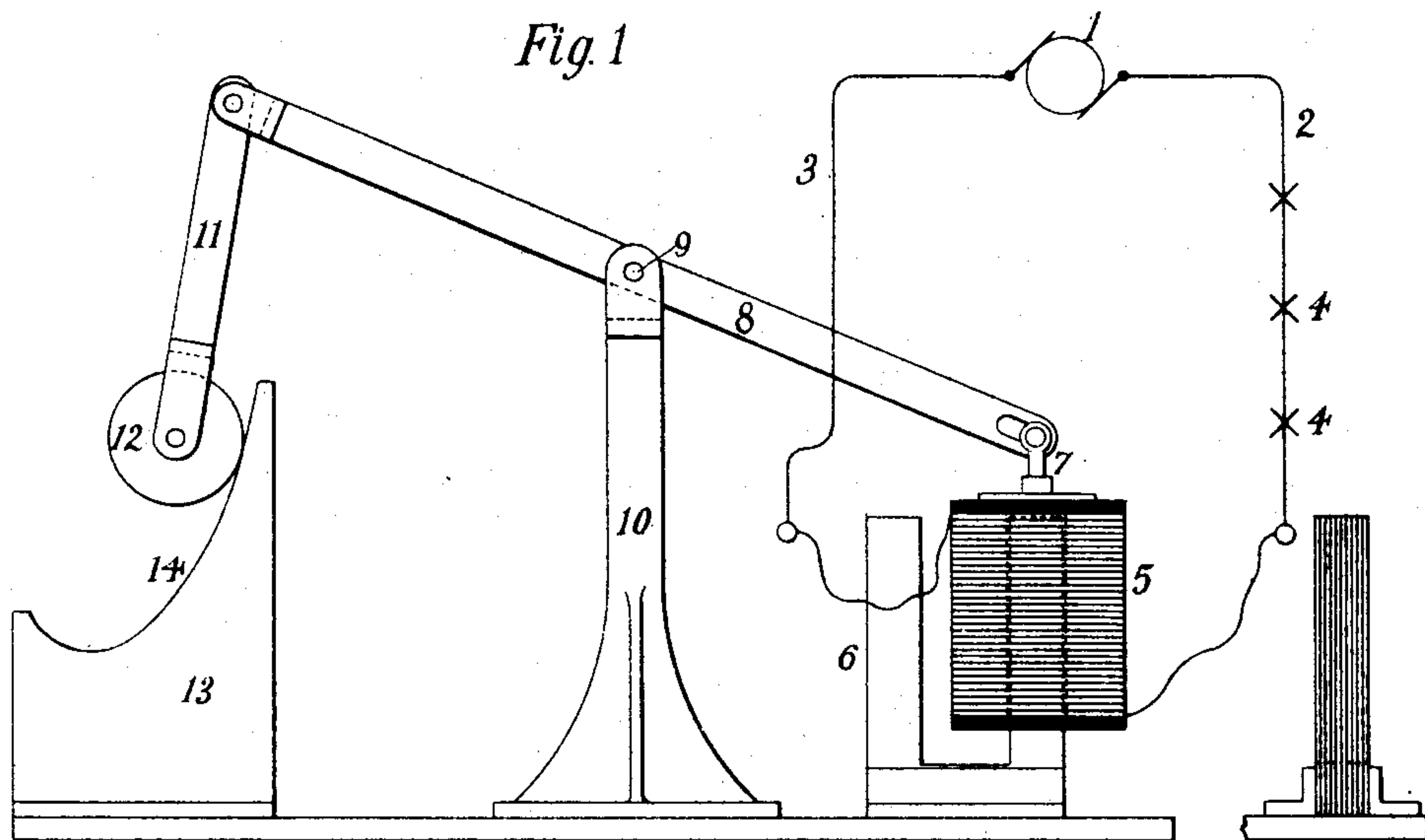
Patented Oct. 8, 1901.

M. H. BAKER.

REGULATING DEVICE FOR ARC LAMP CIRCUITS.

(Application filed Mar. 12, 1900. Renewed Mar. 9, 1901.)

(No Model.)



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## REGULATING DEVICE FOR ARC-LAMP CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 684,166, dated October 8, 1901.

Application filed March 12, 1900. Renewed March 9, 1901. Serial No. 50,532. (No model.)

*To all whom it may concern:*

Be it known that I, MALCOLM H. BAKER, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Regulating Devices for Arc-Lamp Circuits, of which the following is a specification.

My invention relates to improvements in regulators for circuits containing alternating-current arc-lamps arranged in series. Heretofore the regulation of this class of devices has been accomplished through the medium of very complicated and expensive apparatus. By means of my present invention all complication is avoided and the regulation of a current in an alternating-current arc-lamp series circuit is made certain and effective by the use of very simple mechanism having few parts and very little liable to get out of order.

My invention relates, broadly, to automatically varying the reactance in a circuit such as described to compensate for changes in the resistance of the circuit due to the cutting in or out of lamps or to any other cause. Otherwise expressed, my invention relates to automatically varying the value of a variable reactance in the circuit in accordance with changes of resistance in the said circuit in such a manner as to maintain the current practically constant.

In carrying out my invention I include in the circuit in series with the lamps a reactance device consisting of a coil of wire so placed as to have a free relative movement with respect to a laminated core inside the coil. It is well understood that the current passing through a coil having such a relation to a magnetic core is more or less choked or impeded, according to the relative position which the coil and the core occupy, the choking or impeding effect increasing with the farther and farther insertion of the core within the coil and decreasing with the gradual withdrawal of the core from the coil. The relative movements of the coil and the core may be brought about by variations of the magnetic pull due to variations of the current passing through the coil. If now a force could be discovered which would automat-

ically vary the choking effect produced in the coil in correspondence with variations in the resistance of the circuit, which force should oppose and vary with the magnetic pull of the said coil, the value of the current traversing the coil might be made practically independent of the resistance of the circuit, so that a constant current could be maintained irrespective of the number of lamps in operation in the circuit. I have discovered that such a force can be supplied mechanically in several ways. In the present instance I make use of a pivoted lever connected at one end to the moving part of my regulating reactance-coil and at the other end supplied with a weight in the form of a roller adapted to slide upon an incline having a certain "critical curve," whereby the roller in its descent will meet gradually with more and more resistance, so that its effectiveness as a counterpoise to the moving part of the reactance device will gradually decrease as the weight moves downward. When the weight is drawn upward, the reverse action takes place and the effect of the weight constantly increases. In this way the increasing effect of the magnetic pull of the reactance-coil as the core and the coil approach each other more and more intimately is counteracted by the increasing effect of the weight during the progress of this operation, it being understood that the parts are so connected as to cause the weight to be lifted while the core and the coil are approaching each other and to descend as the coil and the core are relatively separated.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 shows my apparatus connected up with a single group of lamps, the position of the parts being that which they occupy at minimum load; and Fig. 2 is a similar view showing the position of the parts when the circuit is fully loaded.

In the drawings, 1 is a suitable source of alternating current. 2 and 3 are mains leading therefrom. The lamps are shown at 4 4, and the regulating or reactance coil appears at 5. The said coil is represented as surrounding one leg of a laminated iron core 6, of horse-shoe shape, and its top is connected by a suitable link 7 to the end of a lever 8, which is



supported on a pivot 9 at the top of a support or standard 10. To the opposite end of the lever 8 is joined, by means of a link 11, a roller 12, constituting a weight or counter-  
 5 balance for the moving part of the reactance device. Below the roller 12 is a standard 13, provided with a guide or track 14, the shape of which is arranged in what I call a "critical curve"—that is to say, the curve of the  
 10 track or guide 14 is so shaped that the roller in its descent meets with a gradually-increasing resistance, while as the weight is drawn upward its effect constantly increases. More than this, the special shape of the curve is  
 15 such that it causes the described effects to vary in precisely the same proportion as the choking effect of the reactance-coil.

Looking at the drawings, it will be seen that as the coil 5 becomes more and more energized by the cutting out of lamps in the  
 20 lamp-circuit the effect of the weight 12 becomes greater, inasmuch as it is brought to a position where the roller meets less and less resistance to its movement in a downward direction. Accordingly the effect of the weight  
 25 increases as the pull of the coil increases. By a careful selection of the curve of the track 14 these counteractions may be made to balance each other with approximately mathematical exactness.

The lever 8 may be attached to the core 6 instead of to the coil 5. The action is the same in either case.

The position of the counterweight 12 when  
 35 the circuit is fully loaded is one in which the magnetic pull of the coil with relation to the core is comparatively slight. It will also be seen that the effect of the weight 12 is at its minimum in this position of the parts. On  
 40 the other hand, when the circuit has its minimum load, as illustrated in Fig. 1, the mechanical effect of the weight 12 is at its maximum, while the magnetic pull as between the coil and the core is also at its maximum.

45 The particular shape of the core of the reactance device may be varied. Moreover, my apparatus may be applied to a single series of arc-lamps, or a number of them may be combined with several series of lamps.

50 The invention claimed is—

1. In a system of electrical distribution, a

regulating reactance-coil having a moving part adapted to vary the choking effect in said coil, a pivoted lever connected to the said moving part, and a weight in the form  
 55 of a roller attached to the said lever, the said weight or roller being adapted to move upon a guide or track having a "critical curve" whereby the effect of the weight increases in the same ratio as the magnetic pull of the  
 60 coil increases.

2. In an electric-lighting system, a regulating reactance-coil having a moving part adapted to vary the choking effect in said coil, a number of arc-lamps in series with the  
 65 said coil, a pivoted lever connected with the said moving part, and a roller connected to the said lever and acting as a weight, in combination with a guide or track having a "critical curve" whereby the effect of the  
 70 weight is automatically varied in the same ratio as the pull of the magnet.

3. In an electric-lighting system, a regulating reactance-coil having a moving part adapted to vary the choking effects in said  
 75 coil, a number of arc-lamps in series with the said coil, a pivoted lever connected to the moving part, and a roller attached to the said lever, in combination with a guide or track having a "critical curve" whereby the said  
 80 roller meets with a constantly-decreasing amount of resistance per unit of upward movement in the same proportion as the magnetic pull of the reactance-coil increases.

4. In a system of electrical distribution, a  
 85 regulating reactance-coil having a moving part adapted to vary the choking effect in said coil, and a weight in the form of a roller attached to the said moving part, the said weight or roller being adapted to move upon  
 90 a guide or track having a "critical curve" whereby the effect of the weight increases in the same ratio as the magnetic pull of the coil increases.

Signed at New York, in the county of New  
 York and State of New York, this 16th day of  
 February, A. D. 1900.

MALCOLM H. BAKER.

Witnesses:

WM. H. CAPEL,

GEORGE H. STOCKBRIDGE.