No. 684,168. Patented Oct. 8, 1901.

M. H. BAKER.

REGULATING DEVICE FOR ARC LAMP CIRCUITS.

(Application filed Mar. 21, 1900. Renewed Mar. 9, 1901.)

(No Model.)

Fig. 1

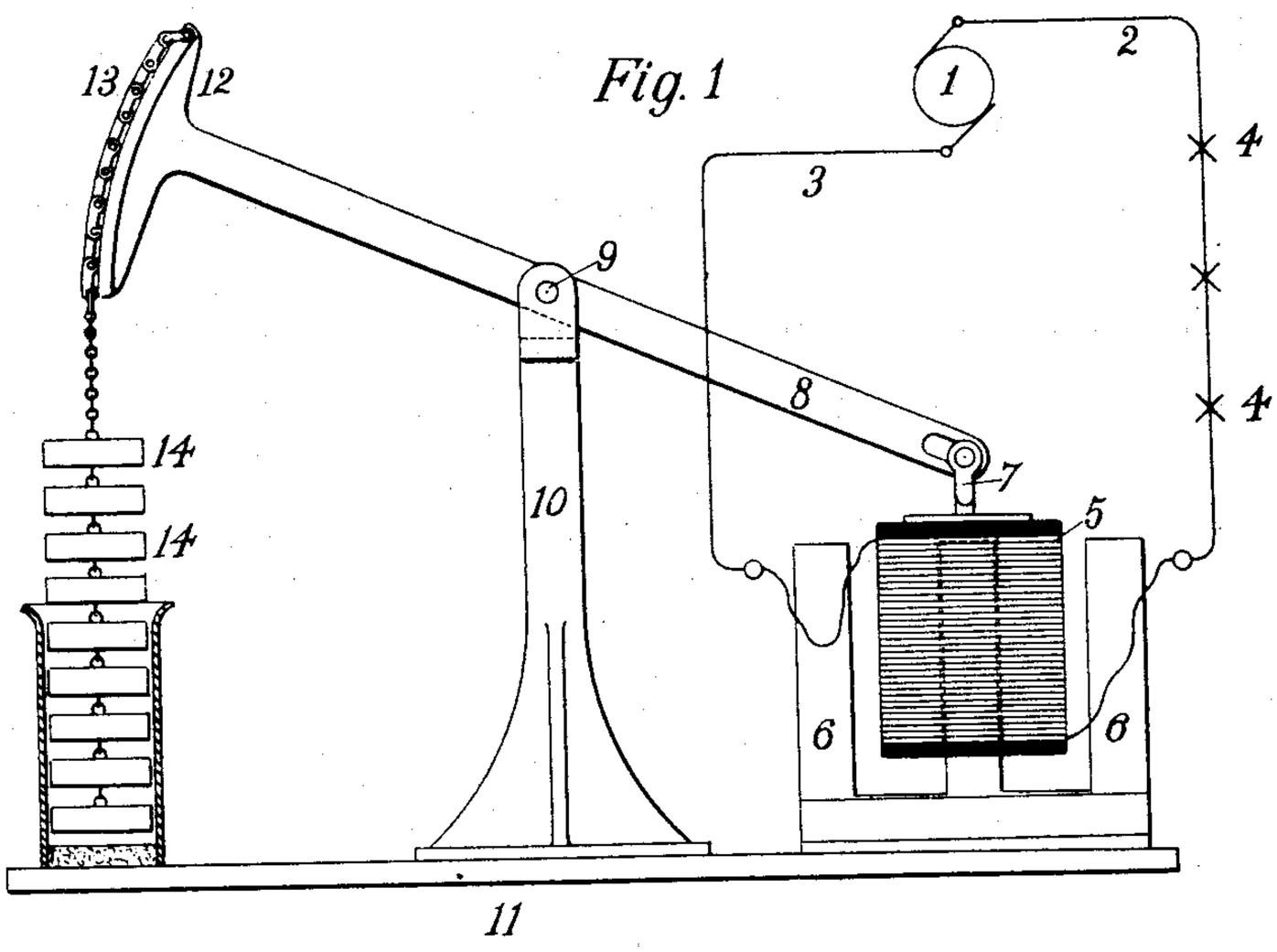


Fig. 2

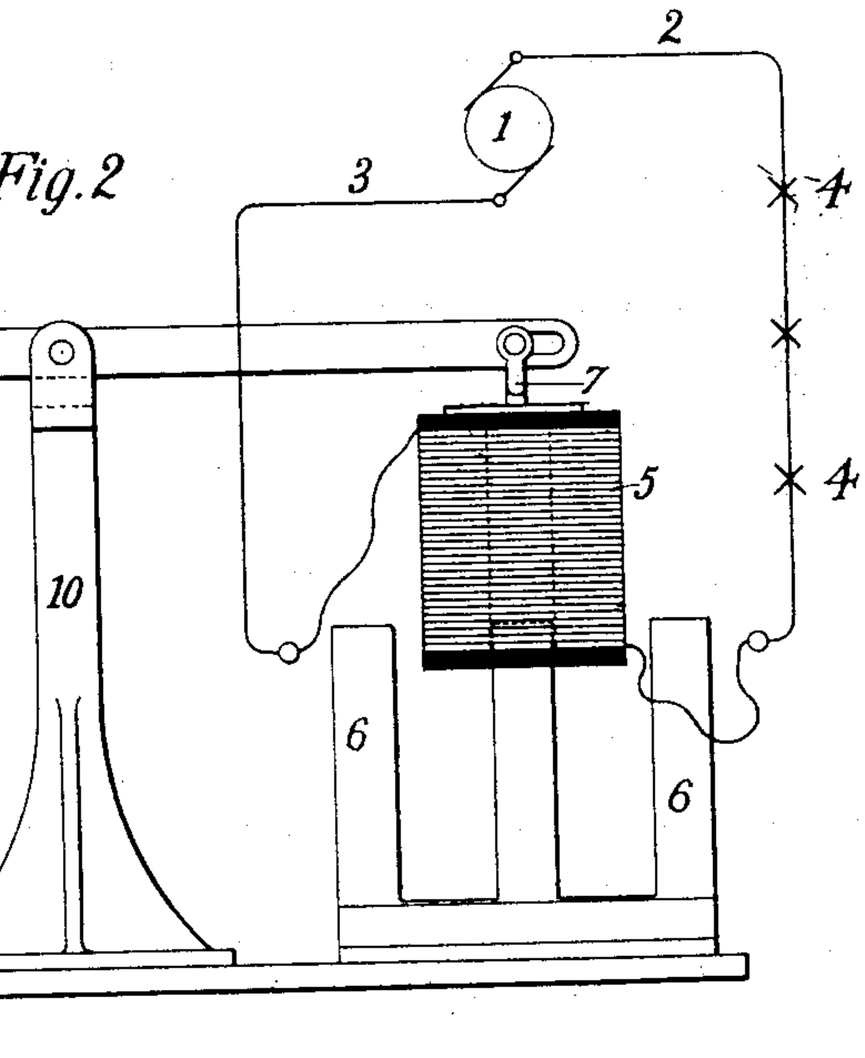
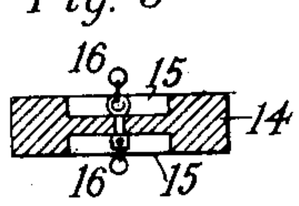


Fig. 3



Witnesses:
Raphael Netter
George H. Stockbridge

Inventor
Malcolm H. Baker
by Charles A. Perry Att'y

UNITED STATES PATENT OFFICE.

MALCOLM H. BAKER, OF NEW YORK, N. Y., ASSIGNOR TO THE MANHATTAN GENERAL CONSTRUCTION COMPANY, OF SAME PLACE.

REGULATING DEVICE FOR ARC-LAMP CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 684,168, dated October 8, 1901.

Application filed March 21, 1900. Renewed March 9, 1901. Serial No. 50,535. (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 automatically 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 device and at the other end to a divided weight or counterbalance made up of several parts so arranged that as the supporting end of the pivoted lever ascends or descends one or more of the separate portions of the weight are thrown into or out of service, as the case may be. To assist in the action of the apparatus, I provide a socket or receptacle for the counterweight which shall take up the several portions or set them free again in the operation of the apparatus. I also prefer to construct the free end of the pivoted lever with a curve, such that the separate parts of the divided weight will always be maintained in the same vertical relation to each other and to the containing-socket. Whether the device which connects the moving part of the reactance apparatus to the divided counterweight is a pivoted lever or not, the arrangement is such that as the pull of the magnet increases, owing to the switching out of lamps in the main circuit, and the moving part of the reactance device is gradually drawn down, caused by an increase of the magnetic pull, the effect of the divided weight shall be correspondingly increased, owing to the fact that hitherto-unused portions of the weight are brought into effective operation, as will be explained farther on. In this way the increasing effect of the magnetic pull of the reactance-coil as the coil and the core 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 divided

weight to be lifted while the coil and core 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. Fig. 2 is a similar view showing the position of the parts when the circuit is fully loaded, and Fig. 3 is a detail view.

In the drawings, 1 is a suitable source of alternating current, and 2 and 3 are electric mains leading therefrom. The lamps are shown at 4 4, and the regulating or reactance coil appears at 5. The coil 5 is represented as surrounding one leg of a laminated iron core 6 of double-horseshoe shape, and its top is connected by a suitable link 7 to the slotted end of a lever 8, pivoted at 9 at the top of a suitable upright or standard 10. The whole is mounted on a suitable base 11. At the opposite end of the lever 8 I form a segment 12, to the upper part of which I attach a chain 13, which carries at its lower end a divided weight made up of different parts or elements 14 14. These several elements consist, essentially, of flat disks or cylinders centrally hollowed out on both sides, as shown at 15 15, Fig. 3, and joined together by links 16 16. The openings or depressions in the center of the different disks allow for the reception of the links 16, so that the plates or disks will drop easily upon one another when the weight is let down, as shown in Fig. 2. A socket 17, with a cushion 18 in the bottom thereof, is mounted on the base 11 in line with the elements of the divided weight, and it is adapted to receive the weight, as shown in Fig. 2, or to let it out again, as appears in Fig. 1.

When the divided weight is in the position shown in Fig. 2, the movable part of the reactance device is in its most elevated position. This represents the position of the parts at maximum load. Should one or more lamps now be cut out of the circuit and the resistance of the main circuit be thereby decreased, the coil of the reactance device will exercise a stronger pull upon the core and these two parts will approach each other, at the same time lifting some of the elements of the weight to a higher position. Meanwhile the pull of the magnet has been constantly increasing, and it will also be noted that the effectiveness of the weight has also been increasing by virtue of the fact that more and more elements of the weight have been lifted from their solid support. Accordingly the effect of the weight increases as the pull of the core increases, and if the number and weight of the different elements of the counterbalance be carefully selected a substantial counterbalance can be maintained throughout the entire excursion of the reactance-coil or core, as the case may be, and of the counterweight.

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

The particular shape of the core of the reactance device may be varied. In the present instance I have chosen what I call a "double-horseshoe" or "three-legged" core, with the coil arranged around the central leg. 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.

The invention claimed is—

1. In a system of electrical distribution, a regulating reactance-coil having a moving part adapted to increase the choking effect in said coil, a pivoted lever connected to the said moving part and also connected at its opposite end to a divided counterweight as set forth.

2. In a system of electrical distribution, a regulating reactance-coil having a moving part adapted to increase the choking effect in said coil, a pivoted lever connected at one end to said moving part and at the other end to a divided counterweight for the said part, the divisions of the said counterweight being so selected as to constitute an exact counterbalance for the magnetic pull of the reactance-coil under all conditions of the circuit.

3. In a system of electrical distribution, a regulating reactance device having a moving part adapted to increase the choking effect in the said device, in combination with a divided counterweight, and means for connecting the said counterweight to the said moving part.

4. In an electric-lighting system, a regulating reactance device having a movable part adapted to increase the choking effect in the reactance apparatus, a number of arc-lamps in series with the reactance device, a device connected to the said moving part and also connected to a divided counterweight.

Signed at New York, in the county of New York and State of New York, this 17th day of March, A. D. 1900.

MALCOLM H. BAKER.

Witnesses:

WM. H. CAPEL,

GEORGE H. STOCKBRIDGE.