

No. 712,524.

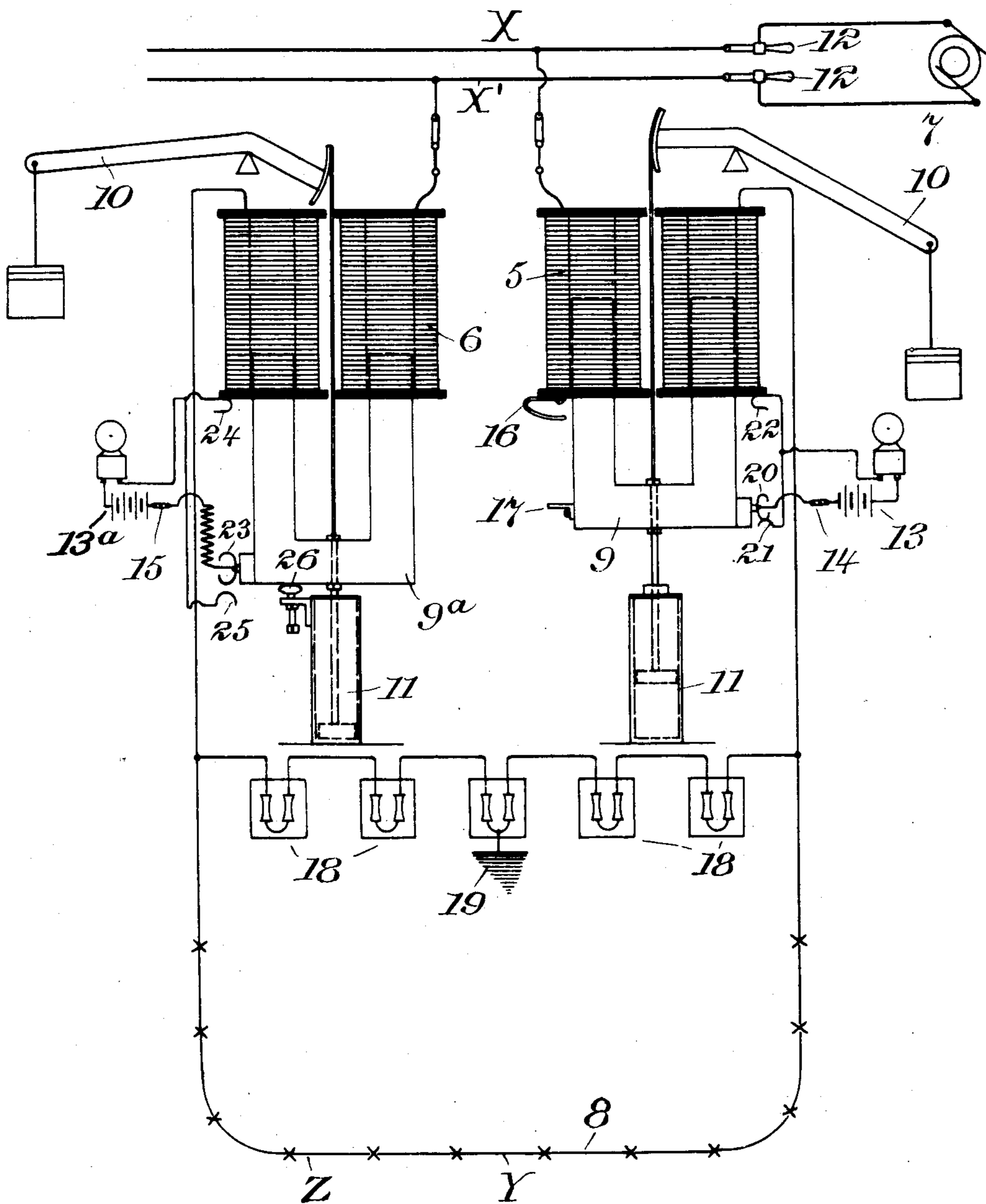
Patented Nov. 4, 1902.

J. H. HALLBERG.

REGULATOR FOR ALTERNATING SERIES ARC LIGHT SYSTEMS.

(Application filed Jan. 29, 1902.)

(No Model.)



WITNESSES:

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REGULATOR FOR ALTERNATING SERIES ARC-LIGHT SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 712,524, dated November 4, 1902.

Application filed January 29, 1902. Serial No. 91,736. (No model.)

To all whom it may concern:

Be it known that I, JOSEF HENRIK HALLBERG, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Regulators for Alternating Series Arc-Light Systems, of which the following is a specification.

My invention relates to a device adapted to be connected in series with the generators and arc-lights of an alternating series arc-light system and which has for its purpose to maintain the current on the line constant irrespective of the number of lamps in operation.

A further object of my invention is to increase the safety and economy of such a system by dividing the regulating apparatus into two or more parts and providing means whereby one of such parts will be operative to effect the regulation required within certain predetermined limits and both parts should such limits be exceeded or one of the two parts be by any means short-circuited.

A further object of my invention is to provide means for protecting the system against the action of lightning.

The accompanying diagram will serve to illustrate my invention, and in which similar characters indicate like parts.

In the drawing, 5 6 indicate two pairs of solenoidal magnets in series with an alternating generator 7 and arc-lamps 8 or other similar devices. Each of these magnets is provided with a core or armature 9 9^a, adjustably counterbalanced through the counterbalance apparatus 10 and dampened against quick movement by the dash-pots 11.

12 indicates switches which connect the solenoids 5 and 6 to the main line; 13 13^a, signaling devices operated by the movement of the cores 9; 14 15, switches, respectively, between the cores 9 and signaling devices 13 13^a; 16, springs on solenoid 5, which coact with the plate 17 on core of the solenoid to prevent cutting in the signaling device 13 until the current on the line exceeds the normal current; 18, lightning-arrester, connected across the line and to ground at 19.

The operation of my device is as follows:

Assuming the switches 12 to the main line and the switches 14 and 15 of the signaling devices 13 13^a to be closed and the normal load in the circuit, the core 9 of the solenoid 5 will be slightly attracted, sufficient to cause the contact 20 to leave the contact 21 and open circuit through the signaling device 13. Should now the load in the main line be decreased by, for instance, cutting out one or two lamps, the solenoid 5 will attract its core and introduce an impedance upon the line-circuit equal to the resistance of the lamps or other devices cut out of the circuit. As the resistance is cut out of the circuit the core 9 of the solenoid 5 continues to rise until the stop 17 is brought in contact with the spring 16, where the movement of the core will be arrested. If further lamps are cut out, the tension of the spring 16 will be overcome and contacts 20 22 brought together, which closes the circuit through the magnet and bell of the signaling device 13, thereby giving notice to the attendant that the solenoid 5 has reached the limit of its regulating capacity. When the limit of the regulating capacity of the solenoid 5 has been reached, the solenoid 6 comes into action and supplements its regulating capacity to that of the solenoid 5.

It is assumed that the regulating capacity of the solenoids 5 and 6 will be sufficient to take care of any changes which may take place in the line-circuit.

In case a ground should take place upon the circuit—for instance, between the points X and Y—the solenoid 5 and the lamps between these points will be cut out of circuit, and the core 9 of this magnet would drop and contact will be made between the contacts 20 and 21, closing the circuit through the magnet and bell of the signaling device 13, thereby giving notice to the attendant that there is a ground on the line. At such time the solenoid 6 will immediately come into action and lift its core 9 to effect the required regulation. Should the regulation required be in excess of the capacity of the solenoid 6, its core will rise until the contact 23 touches the contact 24, which will close a circuit through the magnet and bell of the signaling device 13^a

and indicate the fact to the attendant, who will then open a circuit, and thereby prevent the fuse of the main line blowing, or an automatic circuit-breaker could be thrown into
5 operation by the closing of the circuit through such signaling device.

In case there should be a short circuit on the line between X' and Z, the core 9^a of the solenoid 6 will drop and close the circuit between the contacts 23 and 25, thereby closing
10 the circuit through the magnet and bell of the signaling device 13^a, and thereby indicate such short circuit to the attendant.

In order to maintain the core 9^a with the contacts 23 and 25 separated under normal conditions of operation, a spring device 26 is
15 located under the core and which will exert sufficient upward pressure to keep the contacts 23 and 25 normally separated.

To accomplish the results above stated, it is essential that the solenoid 5 be adjusted to impart movement to its core under variations of current strength which would not produce a corresponding movement in the core of the
25 solenoid 6. In other words, the solenoid 5 should be adjusted to accomplish all the regulation between certain limits and solenoid 6 not to come into action until such limit has been exceeded.

It will be observed that by separating the regulating mechanism into two parts the factor of safety is materially increased, as it is improbable that any short circuit occurring on the line would include more than one part
35 of the regulating device, leaving the other part in a condition to operate and effect the required regulation.

The operation of the lightning-arrester, which is connected across the lamp-circuit,
40 will be readily comprehended by any electrician and need not be described.

Having thus described my invention, I claim—

1. A regulator for alternating series arc-light systems, comprising a device in series
45 with the generator and the current-consum-

ing device, and having one portion responsive to any increase of current upon the line within predetermined limits and a portion which is only responsive to a current in excess of
50 said limits, and which device will act when energized to introduce an impedance upon the line proportional to any decrease in load.

2. A regulator for alternating series arc-light systems, comprising a device normally
55 responsive to an increase of current upon the line, and which will act when energized to introduce an impedance upon the line proportional to any decrease of load, a second similarly-acting device normally irresponsive
60 until the current upon the line exceeds a predetermined amount.

3. A regulator for alternating series arc-light systems, comprising a solenoidal magnet provided with a movable core so designed
65 and adjusted as to be operated by changes in current strength within certain defined limits, a second solenoidal magnet provided with a movable core arranged and adjusted so as not to be acted upon within the limits
70 of current at which the first-named core is active but which will be acted upon by any current in excess of such limit and both of said magnets adapted when energized to introduce an impedance upon the line in which
75 they are connected.

4. A regulator for alternating series arc-light systems, comprising a solenoidal magnet provided with a movable core permanently in series with the line, a second solenoidal
80 magnet provided with a movable core permanently in series with the line, said magnet so arranged and adjusted that the said second-named magnet will not become operative until the limit of the regulating capacity of the
85 first-named magnet has been reached.

In testimony whereof I affix my signature in the presence of two witnesses.

JOSEF HENRIK HALLBERG.

Witnesses:

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