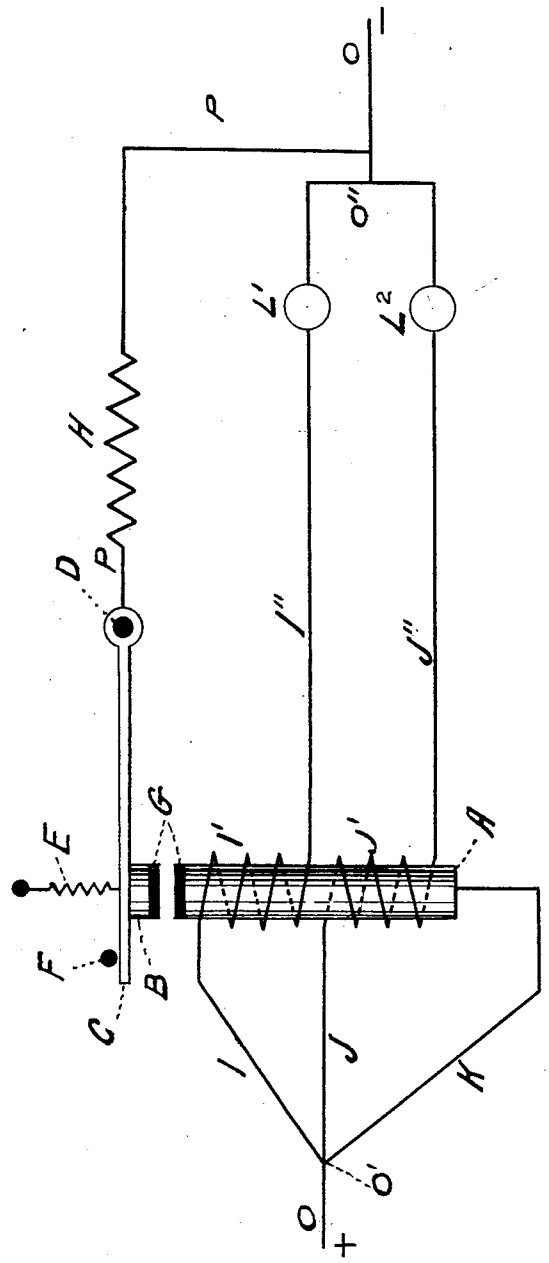
(No Model.) 2 Sheets—Sheet 1.

W. SAWYER.

Automatic Safety Switch for Electric Light Circuits.

No. 230,346. Patented July 20, 1880.

FIG. 1.



WITNESSES.

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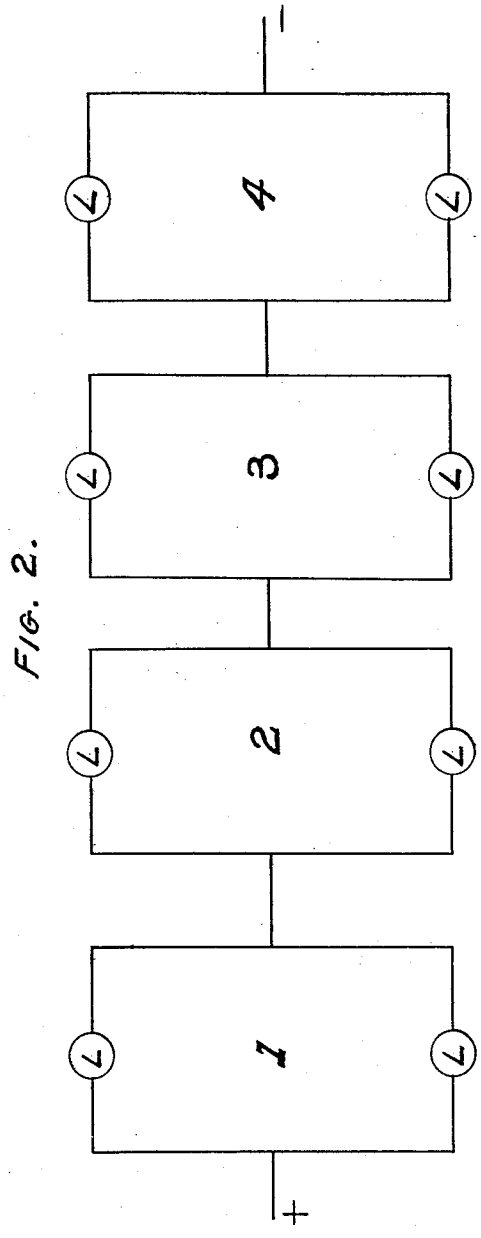


FIG. 2.

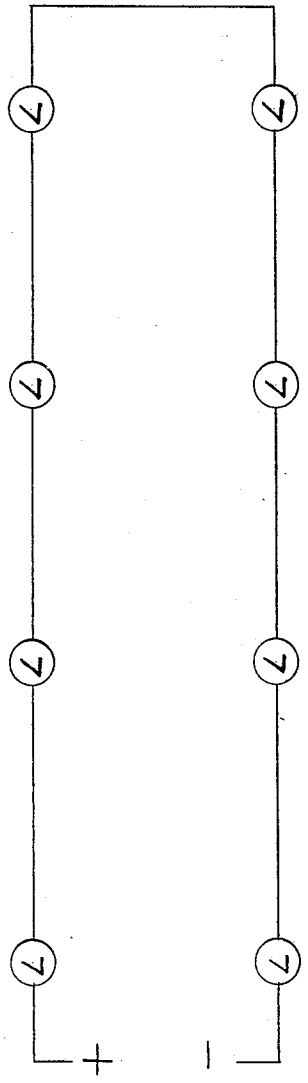


FIG. 3.

WITNESSES.

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UNITED STATES PATENT OFFICE.

WILLIAM SAWYER, OF NEW YORK, N. Y.

AUTOMATIC SAFETY-SWITCH FOR ELECTRIC-LIGHT CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 230,346, dated July 20, 1880.

Application filed April 27, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SAWYER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Automatic Electric-Light Safety-Switch and Distributing System, (No. 2;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My device relates to means and apparatus for distributing and automatically regulating electric currents to operate electric lamps and other electric apparatus; and it consists in an electro-magnet differentially wound and placed in the main circuit of the electric generator, each coil of the magnet having in its circuit an electric lamp; and it further consists in a shunt, which is thrown into the main line circuit when, through breakage or accident, one of the lamps is extinguished or rendered inactive or inoperative for the purpose, and thus relieves the intensity of the current passing through the remaining lamp.

Heretofore, in systems of electric lighting, the electric lamps have been arranged in series on the main line, with the main current passing through the lamps successively, so that whenever one lamp in the series became inoperative the other lamps were extinguished on account of the main current being broken when a lamp was broken, and all lights in the series remain extinguished until the circuit was re-established either by replacing the broken lamp or by connecting the wires outside of the broken lamp.

In my system I overcome these objections by placing each lamp in a branch of the main circuit, the conducting-wire of each of said branches being wound differentially and forming the inducing-coils of an electro-magnet, this electro-magnet being provided with an armature which has a retractile spring connected thereto, the core of the electro-magnet being connected to the main circuit before it enters the lamps, and the lever of the armature being connected to the main circuit after said circuit leaves the lamps by a suitable wire and a resistance equal to the resistance in either of the lamps, the main-line circuit passing around the respective coils of the electro-magnet in an opposite direction, neutralizing each other, thereby causing the electro-magnet to remain inactive; but whenever one of the lamps or the branch circuit thereof is broken from any cause the remaining coil now causes the core of the magnet to become energized and attract the armature B to its pole (the faces of the armature and magnet being provided with platinum or other suitable contact-surfaces G) and make metallic contact therewith, and thereby opening a new route for the current, which is of a resistance equal to the lamp extinguished, and thus restoring the equilibrium of the circuit.

In the accompanying drawings, Figure 1 is a plan view of my apparatus embodying my invention. Fig. 2 is a diagram illustrating a system of circuits as used in my device. Fig. 3 is a diagram illustrating a system of lights in a continuous circuit as in ordinary use.

A is the core of an electro-magnet differentially wound with insulated coils of wire I J of suitable size. One terminal of each differential coil is connected to a branch wire, I, from the main circuit O. One terminal of coil J′ is attached to the main circuit by a wire, J, the main wire O being in metallic connection with the core A of the electro-magnet by the wire K. The remaining terminals of the coils I′ and J′ are connected, respectively, to the lamps L′ L^2 by conductors I″ J″. The wires I″ J″ are reunited after passing through the lamps, and again form the main line O, and so on to another section containing branch circuits with their lamps.

B is an armature placed opposite to the core of the electro-magnet, and fixed to a lever, C, pivoted at D.

E is a retractile spring, and F a stop limiting the backward movement of lever C. To said lever is connected a wire, P, which contains in its circuit a resistance, H, which is equivalent to that of either of the lamps in the branch circuit, said wire P being connected to

the main line O after the branch circuits have been reunited after passing through the lamps.

The operation is as follows: The current from the magneto-electric generator or other source of electricity enters the main circuit at O, and is divided at O′ into three branches, I J K, the branch I being connected to one terminal of the coil I′ and branch J being connected with terminal of J′, the branch K being in metallic connection with the core of the magnet A, the other terminals of coils I and J being connected to the lamps L′ L² by wires I″ J″. The coils I and J are wound around the core differentially. Thus induction being neutralized, the current will flow through said coils and their conducting-wires to the lamps equally, and after having performed their function are reunited at O″ and pass off through O to the next series of lamps in the system. Now, if one of the lamps—say L′—should become broken, the current through coil I′ ceases, while the inductive action of coil J′ remains and converts the core into a magnet and attracts armature B and causes the surfaces G to come into contact. A new route for the current has now been opened by wire K, core A, contact-surfaces G, armature B, lever C, wire P, and resistance H to the main line, one half going through the operative lamp and the other half through resistance H, thus re-establishing the equilibrium between the branches, and the flow of the current remaining uninterrupted.

I do not limit myself to this mode of operating the automatic switch or shunt, for it is obvious that the soft-iron core A may be dispensed with, and in lieu thereof I may use a wire, the lateral expansion of which will operate to close the circuit through the circuit-preserving switch. For instance, while the circuit is equally divided through the coil surrounding this wire it remains in its normal condition; but when one of the lamps is extinguished or broken and the current caused to pass through one coil only the said coil will become heated and cause the wire within the coil to elongate and make contact with suitable contact-points in connection with the shunt H, and thus restore the requisite equilibrium, as in the first instance.

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

1. In an automatic electric-light and distributing system, a differential magnet having a lamp in the circuit of each coil, substantially as described.

2. In an automatic electric-light and distributing system, as described, a system of electric lamps having subdivisions composed of three branches of equal resistance, two of which contain the electric lamps, and a third remains inactive until a lamp is broken and thereafter rendered inoperative, when said third branch is thrown into the main circuit and brings into said circuit a resistance equal to the resistance of the lamp extinguished, and thereby restores the normal current passing through the subdivision, substantially as described.

3. In an automatic electric-light and distributing system, the combination of a differentially-wound magnet and a lamp in the circuit of each coil with a shunt around said lamps, whereby upon the breakage of either lamp the magnet is rendered active and the shunt operates to restore the current passing through the remaining lamp to its normal strength, substantially as described.

4. In an automatic electric-light and distributing system, a main-line current divided into three branches, one of which is inactive until one of the others is broken, when the remaining one acts to restore the circuit which before passed through the broken lamp, whereby the strength of the current passing through this subdivision is restored, substantially as described.

5. In an automatic electric-light and distributing system, as described, the combination of main-line circuit O, divided circuits I J, and differential coils I′ J′ with the lamp-circuit wires I″ J″, substantially as described.

6. In an automatic electric-light and distributing system, the combination of main-line circuit O, divided circuits I J, differential coils I′ J′, and lamp-circuits I″ J″ with lever C, provided with a retractile spring and a resistance-coil, H, substantially as described.

7. In an automatic electric-light safety-switch and lighting system, the combination of the core A, branch wire K, forming a branch of the main-line circuit, wires I and J, also forming a branch of main-line circuit, with coils I′ J′, and lamp-circuits I″ J″, and a shunt, H, in connection with lever C, having an armature, B, whereby when either of said coils is rendered active by the breaking of a lamp the magnet-core A is magnetized and the armature B attracted thereto, and the resistance H thrown into the main circuit in lieu of that of the broken lamp, substantially as described.

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

WM. SAWYER.

Witnesses:

LEONARD SAWYER,

ADOLPH L. SANGER.