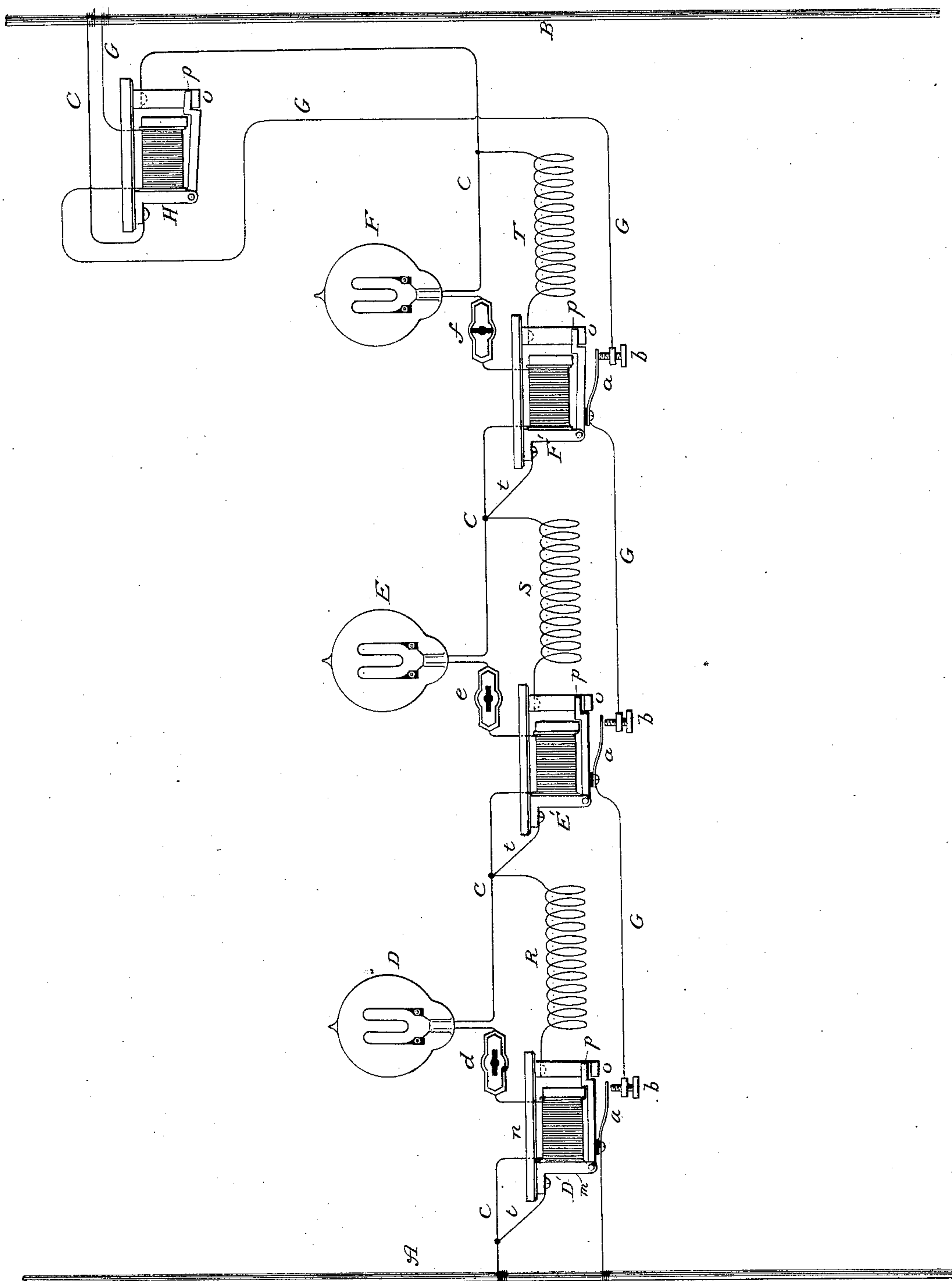


(No Model.)

E. WESTON.  
SYSTEM OF ELECTRIC LIGHTING.

No. 304,883.

Patented Sept. 9, 1884.



Attest:  
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# UNITED STATES PATENT OFFICE.

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## SYSTEM OF ELECTRIC LIGHTING.

SPECIFICATION forming part of Letters Patent No. 304,883, dated September 9, 1884.

Application filed February 21, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD WESTON, a subject of the Queen of Great Britain, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Systems of Electric Lighting, of which the following is a specification, reference being had to the drawing accompanying and forming a part of the same.

In an application for a patent filed by me, and numbered 119,430, I have described a system of electric lighting in which provision is made for inserting in the derived circuits of a multiple-series system resistances equal to and in place of lamps that are cut out, and also for cutting out a given derived circuit when all the lamps in such circuit have been cut out. By this arrangement a waste of energy is avoided and the proper conditions maintained for the normal running of the lamps that remain in action, inasmuch as a derived circuit which still remains closed after all the lamps are cut out absorbs just so much electrical energy for no useful purpose. My present invention relates to this system, and is an improvement thereon, in that it provides for an entirely automatic operation of the system by which the derived circuits are cut out when all the lamps have been extinguished, whether by design or by accident, such as the burning out or breakage of one or more of the lamps.

In describing the special features of my invention, reference is had to the drawing, which represents the main conductors of an electric circuit and a cross or derived circuit containing an arbitrary number of incandescent lamps in series. All the derived or cross circuits of a given system being in every respect alike, but one is here shown in illustration of the invention.

A B are the main conductors of a given circuit. C C C indicate the path of a derived or cross circuit between such conductors and including the lamps D E F.

In the circuit, C, between the main A and lamp D is a magnet, D', secured to a metal standard, m, set on an insulating-base, n.

To the standard m is pivoted an iron arma-

ture, p, which vibrates between the pole of magnet D' and a back stop, o, of metal. This device forms what is commonly known in the art as a "cut-out," and, for convenience, will be so designated hereinafter, the term being employed to indicate any similar device for automatically interposing a resistance in the place of a lamp extinguished. A similar cut-out, E', is placed in the circuit, C, between lamp D and lamp E, and so on. Between each cut-out and the lamp near which it is placed is a manual switch, d e f, constructed for closing or breaking the circuit C. The standards m of the cut-outs are connected to the conductor C by wires t. The stops o are also connected to the conductor C through resistance-coils R S T, each one of which has the same resistance as that of a lamp. The conductor C between the lamp F, or the last of the series, and the main B is severed and its ends connected to the back stop, o, and standard m of a cut-out, H, similar in mechanical construction to those described, but of much higher resistance. The magnet of this cut-out is included in a circuit, G, formed in the following manner: A wire is run from main A to a conducting-strip, a, secured to but insulated from the armature p of cut-out D'. In the path of movement of this strip is a conducting-stop, b, connected with a similar strip on the armature of cut-out E'. The circuit is continued in this way, the last pin, b, being connected with the main B by that portion of the circuit G that includes the magnet of cut-out H.

The operation of the system is as follows: Assuming that the lamps are all running, then it is evident that the armatures of the cut-outs D', E', and F' will be raised, while that of cut-out H will be in contact with its back stop. If, now, one of the lamps, as F, be broken, burned out, or turned off by the switch f, the interruption of the circuit C causes the armature of cut-out F', and perhaps others, to drop; but this re-establishes the circuit C through the resistance T, so that all the remaining lamps will continue to burn, or will be instantly relighted in case they, too, had been shunted out of the circuit. The drop-



ping of the armature of cut-out F' closes one of the breaks in circuit G, which, however, still remains incomplete from the elevation of the other armatures. This operation is repeated and another break in circuit G closed each time a lamp is extinguished from any cause. When the last lamp is out, the circuit G will be completed and the magnet of cut-out H rendered active in consequence, its armature will be drawn up, and the circuit C, with its resistance-coils, will be broken. As the resistance of circuit G is very high, but little current will pass through it between the mains A and B. When it is desired to start one or more of the lamps up again, the circuit G must be first interrupted and a lamp then turned on. Then so long as any one lamp is running the circuit G will remain broken. The circuit G may be broken for this purpose in many ways, as by raising for a moment one of the cut-out armatures; or the switches *d e f* may obviously be constructed in many well-understood ways for effecting the momentary interruption of the circuit G. When the cut-outs D' E' F' are included in the main circuit, it is possible for them all to operate upon the extinguishment of a lamp; but in practice it has been found that this rarely or never occurs. The rupture of circuit C by such an occurrence may be easily guarded against by constructing the armature of cut-out H in such a way that it will not respond instantly to the attraction of its magnet in leaving the back stop.

I have now described the manner in which my invention is or may be carried into effect.

Without confining myself to any particular mechanical construction of the parts described, what I claim is—

1. The combination, with an electric circuit containing two or more electric lamps in series, and automatic cut-outs for interposing resistances in place of lamps extinguished, of a supplemental circuit of high resistance, having breaks that are closed by the cut-outs, and including a device for interrupting the lamp-circuit when by the operation of the cut-outs all the breaks in the supplemental circuit are closed, substantially as set forth.

2. The combination, with a main circuit and a derived or cross circuit containing two or more electric lamps in series, and electro-magnetic cut-outs or devices for interposing resistances in place of lamps extinguished, of a cross-circuit of high resistance having breaks that are closed by the cut-outs when they are brought into operation, and an electro-magnetic device for interrupting the lamp-circuit when all the breaks in the other are closed, all substantially as set forth.

3. The combination, with a derived or cross circuit from the conductors of a main line, and containing two or more electric lamps in series, and electro-magnetic cut-outs for interposing resistances in place of lamps extinguished, of a supplemental cross-circuit of high resistance, a device included therein for interrupting the lamp-circuit, and contact-strips connected with the cut-outs and operating to form or to close breaks in the supplemental circuit, as and for the purpose specified.

In testimony whereof I have hereunto set my hand this 18th day of February, 1884.

EDWARD WESTON.

Witnesses:

W. FRISBY,

W. H. DOGGETT.