(No Model.) 2 Sheets—Sheet 1.

L. VIALET-CHABRAND.

ELECTRIC LIGHTING SYSTEM.

No. 503,688. Patented Aug. 22, 1893.

FIG. 1.

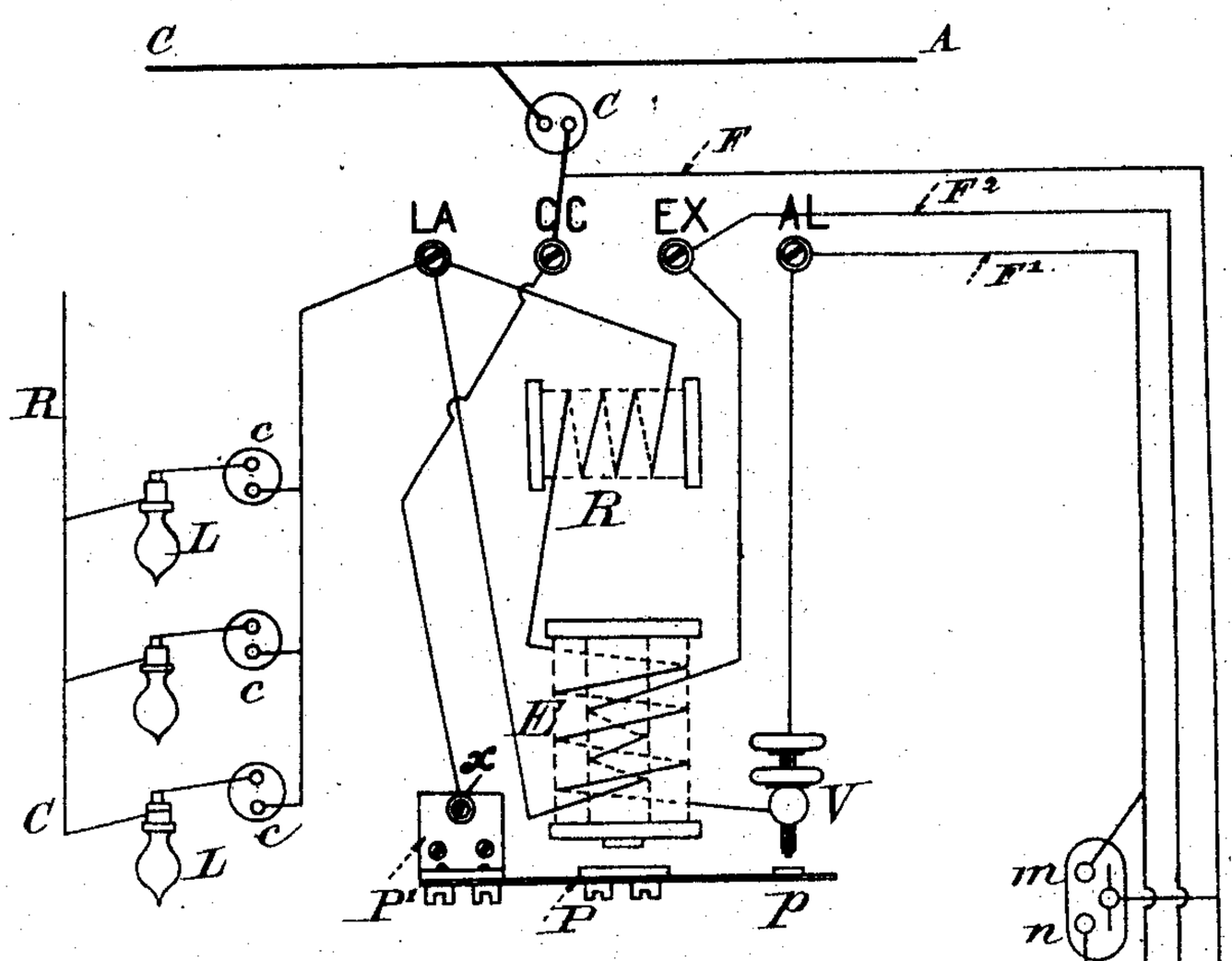


FIG. 3.

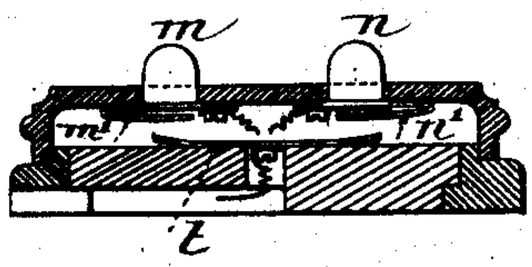
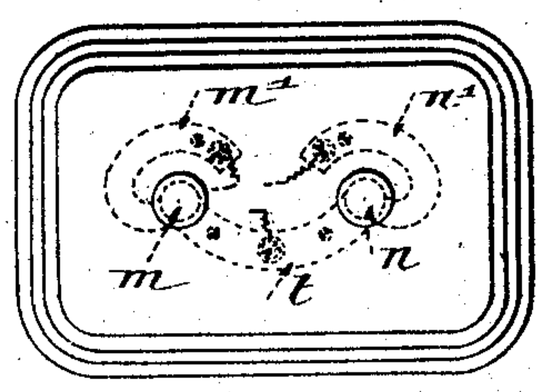


FIG. 4.



Witnesses:-

Camille Wilhelm

L. E. Thirion

Inventor:-

Lucien Vialet-Chabrand

(No Model.)

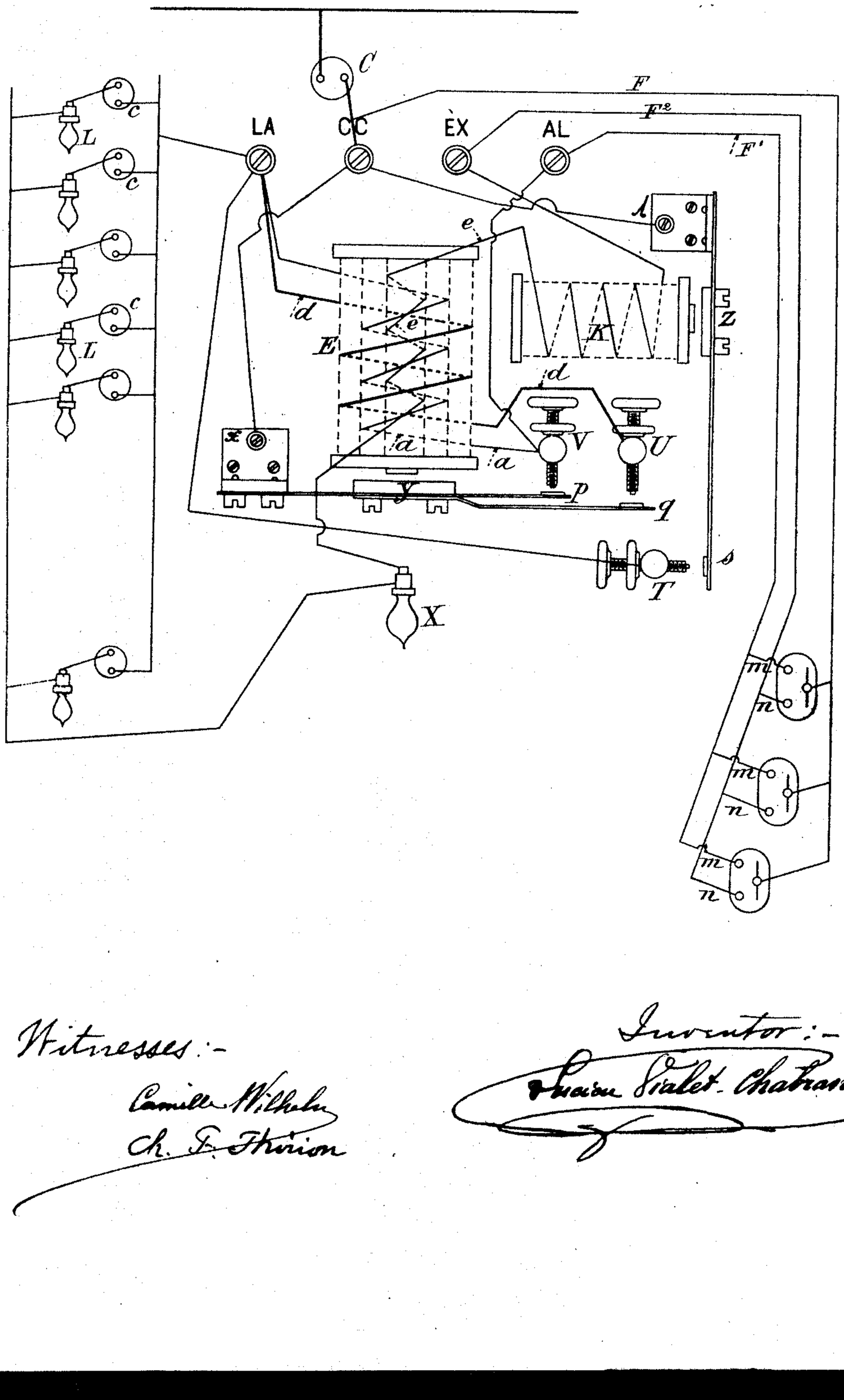
2 Sheets—Sheet 2.

L. VIALET-CHABRAND.

ELECTRIC LIGHTING SYSTEM.

No. 503,688. Patented Aug. 22, 1893.

FIG. 2.



Witnesses:-

Camille Wilhelm

Ch. L. Thirion

Inventor:-

Louis Vialet-Chabrand

UNITED STATES PATENT OFFICE.

LUCIEN VIALET-CHABRAND, OF CIOTAT, FRANCE.

ELECTRIC-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 503,688, dated August 22, 1893.

Application filed April 2, 1892. Serial No. 427,448. (No model.) Patented in France October 24, 1890, No. 209,101, and in England October 30, 1890, No. 17,394.

To all whom it may concern:

Be it known that I, LUCIEN VIALET-CHABRAND, engineer-electrician, residing at Ciotat, Bouches-du-Rhône, in the Republic of France, have invented a new apparatus for controlling, from a distance and from any number of points, electric lamps, (for which I have obtained Letters Patent of France for fifteen years, No. 209,101, dated October 24, 1890, and of England, No. 17,394, dated October 30, 1890;) and I do hereby declare that the following is a full and exact description thereof, reference being made to the accompanying drawings.

My invention relates to apparatus for controlling, that is to say, for lighting or extinguishing lamps arranged on a circuit, from as many points as may be desired, by means of simple buttons, one of which serves to light, and the other, to extinguish the lamp.

My apparatus are arranged in two chief ways, according to the distance of the lamps from the point, where the operation for lighting or extinguishing them is to be performed, arrangements, which I will now describe in referring to the accompaning drawings, in which—

Figure 1 shows the first arrangement, and Fig. 2, the second arrangement.

The first arrangement concerns an apparatus designed for the cabin of a steamer or small apartment, and which gives control over from one to three lamps of ten candle power. This arrangement comprises the electro-magnet E, with double coil, and the resistance R. The electric current, which is to light the lamps L, is brought by the cable C A; from there it is directed to the chief cutout C, then to the binding screw C C of the cutout, and afterward to the screw x of the support P′, of the armature P, of the electro-magnet E. The current is then taken, between the chief cutout C and the binding screw C C, by a wire F, which conducts it to a contact plate or blade t, of the two push buttons m and n. From the push buttons m, designed for the lighting of the lamps, start conductors F′, which extend to a lighting terminal A L, then to the contact screw V, which is also connected with the outer coil of the electro-magnet E. The push buttons n are connected by a branch with a conductor F^2, which leads to the extinguishing terminal E X, which is connected with the wire of the inner coil of the electro-magnet E. The inner coil of the electro-magnet E, which is, as I have already said, connected with the extinguishing circuit F^2, is of feeble resistance and leads to the terminal L A. The outer coil, which is in the lighting circuit, passes through the resistance R and also comes to the terminal L A. These two coils of the electro-magnet E are so arranged that the currents, which pass through them, have a tendency to give to the core opposite polarities. From the terminal L A, the current passes to the lamps L, and then to the return circuit C R. The cutout which precedes the lamps is lettered *c c*.

The operation of the system is as follows: If it is required to light either one or two of the lamps shown, all that is necessary is to push the button m. of the circuit closers m. n. The current, starting from the cutout, passes through the plates put in contact by the button, and reaches the terminal A L; from there it goes through the lighting coil, which is the one outside the electro-magnet E, the resistance R, to the terminal L A, and then to the lamp or lamps, which thus become lighted. When passing through the lighting coil, the current magnetizes the core of the electro-magnet E, and draws the armature P, which establishes a contact between the plate p and the screw V. As soon as this contact takes place, the current finds two ways leading to the lamps: the first one through the wires connected with the plates of the button m, which is still being pushed, one of which wires takes the current in the neighborhood of the cutout C, and the other of which conducts it to the terminal A L; and the second one through the terminal C C, the screw x, contact p V, outer coil to the terminal L A, in communication with the screw V. By following these two paths, the current arrives at the lighting coil, through which it passes to the lamps. If now the button m is released, we shall see that the current, taking advantage of the only road, which is still left open to it, that is to say, through the terminal C C, screw x, contact p V, terminal L A, will pass through the lighting coil, and that the lamps will remain lighted.

The act of pushing the button *m* has then had the effect of lighting the lamps; we will now proceed to show that in pushing the button *n*, we shall extinguish the lamps. Let us push the button *n*, the current, taken at the cutout C, will arrive at the terminal E X, pass through the inner or extinguishing coil, and then reach the terminal L A, that is to say, the lamps. So the current, which starts for the said lamps, is no longer obliged to pass entirely through the lighting coil and the resistance coil R; the core of the electro-magnet is demagnetized and the armature P falls back, breaking the contact between *p* and the screw V. If now we release the button *n*, the lamps will be extinguished. This is the part played by the resistance R: Let us remark that when we push the button *n*, the current feeding the lamps finds, as we have already said, two paths, the first one of which is through the terminal C C, screw *x*, contact *p* V, lighting coil, and coil R, to reach the terminal L A. The second path is from the cutout, through the wires which lead to the plates of the push button *n*, the terminal E X, and the extinguishing coil, to reach the terminal L A. The second road is from the cutout, through the wires which lead to the plates of the pusher *n*, the terminal E X and the extinguishing coil, to reach the terminal L A. The part of current in these two circuits depends on the resistance offered by each of them. If the resistance of the extinguishing circuit, which consists of the wires leading to the pusher *n* and the inner coil, is very feeble when compared to that of the lighting circuit, nearly all the current will pass into the extinguishing circuit; and, on the other hand, the core of the electro magnet, being polarized in the opposite sense by the superior intensity of the current passing through the extinguishing circuit, can no longer retain the armature, which falls back, whereby the extinction of the lamps is secured as soon as the button *n* is released. If, on the contrary, the extinguishing circuit offers greater resistance when compared with the other circuit there may be enough current in the lighting coil to cause the polarization of the core of the electro-magnet to be sufficient to maintain the armature drawn, and in that case the extinction of the lamps would be impossible. It is necessary therefore, to reduce the resistance of the extinguishing circuit, and to employ, for connecting the push buttons with the electrical apparatus, wires, the section of which is in proportion with the distance there is between the above named parts. Or the extinguishment may be secured by increasing the resistance of the lighting circuit, that is to say in placing the coil R, therein. We do not, however, recommend the use of this coil in general, because it has the inconveniency of increasing the loss of energy during the time the lamps are burning, although this loss is a very small one. The electro-magnet will have one or two coils, and might be replaced by a solenoid, the core of which, in being moved, would establish the necessary contact.

Fig. 3 shows a vertical section of the push button. Fig. 4 is a plan view; *m* and *n* represent the two buttons, which act respectively on the plates *m' n'* to put them in contact with the small plate *t*, reached by the current. This current also reaches each of the plates *m* and *n*.

In the second arrangement, Fig. 2, I show an apparatus comprising two electro-magnets, of which the one E serves for lighting, and the other K for extinguishing. The lighting electro-magnet E bears three coils: First the inner coil *e*, or the extinguishing coil, is in circuit with that of the extinguishing electro-magnet K and has the tendency to give E a polarization opposed to that it receives from the other two coils, and neutralizes their effect. This first inner coil comprises only one layer of fine wire. Its object is to de-energize the core of the electro-magnet E, when extinction is wanted, that is to say, to get the armature V away from the core. Second. The middle coil *a*, or lighting coil properly so called, is of rather fine wire and having sufficient turns so as to require only the current for one of the group of lamps L, for its proper action. Third. The outer coil *d*, or derivation coil, is of much coarser wire than the two others. These two last coils *a* and *d* reach to the terminal L A, and start, the one from the screw V, and the other, from the screw U. The coil K of the extinguishing electro-magnet is of fine wire, the section of which is proportionate to the intensity of current required by the lamp X, which serves as a resistance. The operation of this arrangement is as follows: In supposing that the group comprises ten lamps, for instance, we must be able to control one, or several, or all of these lamps, and that without producing in the coils an appreciable fall in potential. To light, one has only to push one of the buttons *m;* the current circulates as in the apparatus in Fig. 1; it reaches the terminal A L, the screw V, passes through the central coil *a*, to the terminal L A, and then to the lamp or lamps, which become lighted. The polarization of the core of the electro-magnet E draws the armature *v*, whereby contact is made between *p* and V, and also between the small plate *q* and the screw U. As soon as these contacts are established, the button *m* is released the current going to the lamps and starting from the terminal C C of the cutout, reaches the screw *x*, passes through the armature *v*, the contacts *p* V and *q* U, and, in circulating in the central coil and the outer coil, the wire of which is much larger, continues to magnetize the core, which retains the armature *v*.

We observe that when pushing the button *m* and until contact between *q* and U takes place, the current circulates wholly in the central coil, and magnetizes the core very strongly, while, as soon as there is contact between *q*

and U, this magnetization is weakened. At this moment, it is true, as the armature is bearing against the core, the magnetization, has only to maintain it in that position, and does not need, to be so strong as when the armature is to be moved a considerable distance. These two coils, put in derivation on the circuit of the lamps, offer a very feeble resistance; so the fall of potential, which takes place in the apparatus when all the lamps of the group are controlled, is insignificant and the number of watts, which are lost in the coils to get the benefit of the control of the lamps, may be considered as being of no importance.

We have just seen that in pushing one of the buttons *m* we have produced the lighting of the lamps; to extinguish them, let us push one of the buttons *n*. The current starting from the cutout C comes and passes through the contact established between the push buttons, reaches the terminal E X, goes through the coil of the electro-magnet K, the inner coil of the electro-magnet E, and arrives at the lamp X, which becomes lighted.

The core of the electro-magnet K being very strongly polarized, draws the armature Z, which carries the platine button *s* against the point of the screw T; as soon as this contact is made, the current, which went to the lamps in starting from the terminal C C and then going by the screw *x*, contacts *p* V and *q*, U, and the two coils, to reach the terminal L A, comes and passes nearly wholly by the circuit, comprising screw I, armature Z, contact S T, and the terminal L A, which offers no resistance. If a very small part of the current continues to pass in the two outer coils of the electro-magnet E, its effect becomes void through the passage of the current of lamp X in the inner coil, which magnetizes the core in the opposite series. So the armature *v* is sure to fall back, and the extinction of the lamps will have taken place. With this arrangement, the distance of the pushers from the controlling apparatus may be as great as desired. If the resistance of the wires connecting the above named parts is a high one, the type of the lamp X is so chosen that the current may be intense enough to produce a full draw of the armature Z, that is to say an effective contact between the parts S and T.

The push buttons *m* and *n* and their necessary electrical connections to the lines may be termed, respectively, the lighting and extinguishing switches. Also the electro magnets and armatures and the contact points and electrical connections co-operating therewith may be designated as automatically acting switching means.

I claim as new and desire to secure by Letters Patent—

1. The combination in an electric lighting system, of an electric lamp, or lamps, lighting and extinguishing switches, an electromagnet, its core carrying a lighting coil, and also an extinguishing coil wound in opposite directions, its armature connected with the main circuit, contact point or screw V in the lighting circuit, contact point, or plate, *p* connected with said armature, the contact *p* V being closed by the lighting circuit attracting the armature and released by the extinguishing circuit repelling said armature, substantially as set forth.

2. The combination, in an electric lighting system, of an electric lamp, or lamps, lighting and extinguishing switches, a continuous circuit from a lighting switch to the lamps containing the contact point V and a coil for energizing an electro-magnet, a branch from the main circuit carrying the contact point *p* and the armature of such electro-magnet, a continuous circuit from an extinguishing switch to the lamp or lamps and containing a coil for releasing such armature, both coils being wound on the same core and in opposite directions, substantially as set forth.

3. The combination, in an electric lighting system, of an electric lamp, or lamps, lighting and extinguishing switches, a continuous circuit from a lighting switch to the lamps containing a contact point V and a coil for energizing an electro-magnet E, a continuous circuit from an extinguishing switch containing a coil for energizing electro-magnet K, a second coil for deenergizing electro-magnet E, and a resistance X, a branch circuit connecting with main circuit and carrying the armature for electro-magnet E and also contact points *p* and *q*, a branch circuit connecting with lighting circuit and containing contact point U and a coil for energizing electro-magnet E, and a circuit between the main circuit and the lighting circuit containing armature Z and contact points *s* and T, substantially as set forth.

4. The combination with an electric lighting circuit, and its electric lamp or lamps, of lighting and extinguishing switches (one or more sets) intermediate electro-magnets and armatures, and conductors connecting said switches with said electro-magnets, one of said electro-magnets being provided with three coils, two of said coils serving to attract and hold the armature to close two circuits and the other coil serving to repel the armature, the other electro-magnet serving by attracting its armature to close a circuit of low resistance around the magnets, and serving to extinguish the lamps, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

LUCIEN VIALET-CHABRAND.

Witnesses:
CAMILLE WILHELM,
CH. F. THIRION.