No. 793,188. PATENTED JUNE 27, 1905.

C. M. GREEN.

SYSTEM OF ELECTRICAL DISTRIBUTION.

APPLICATION FILED NOV. 3, 1897.

FIG. 1.

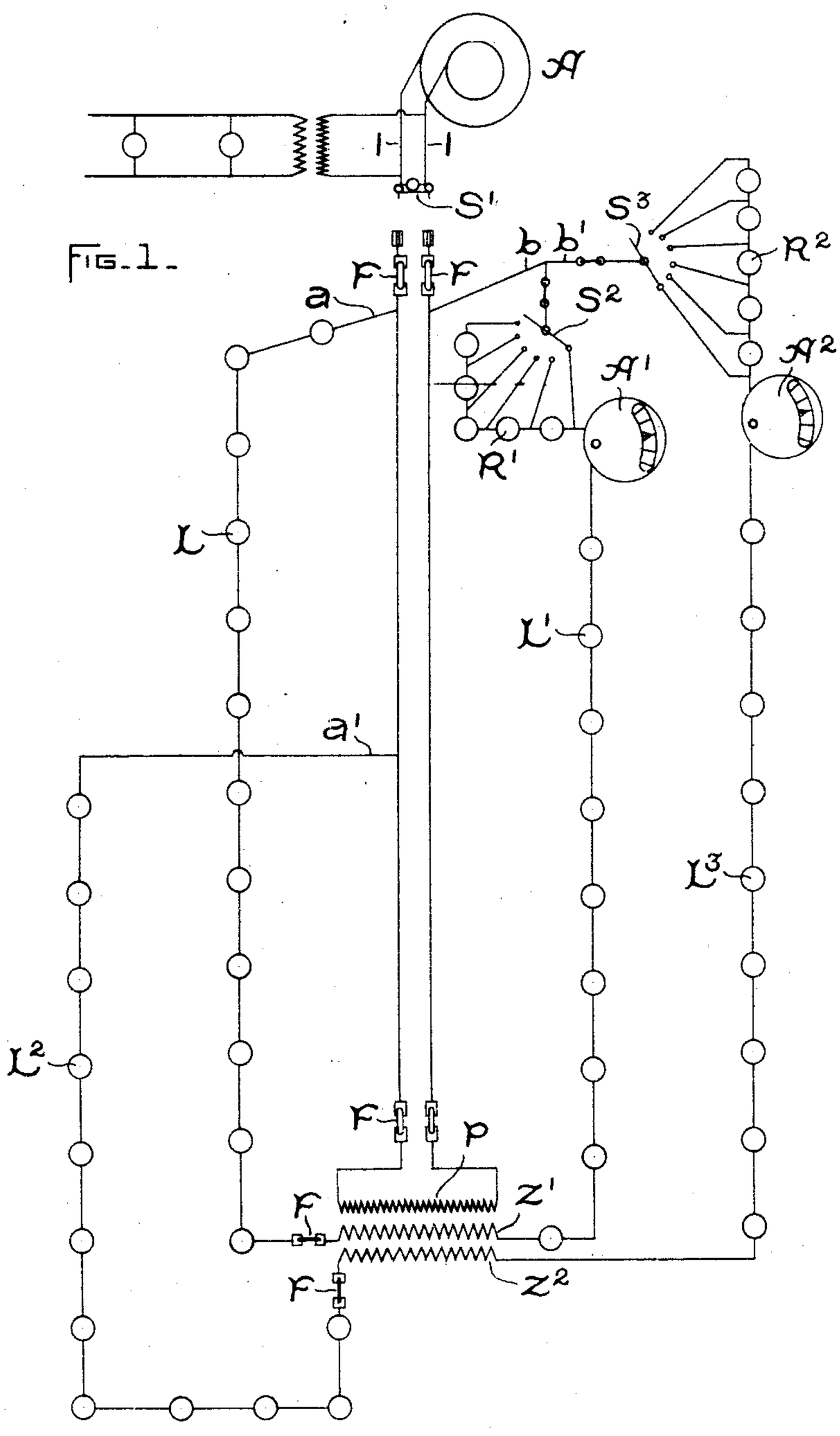
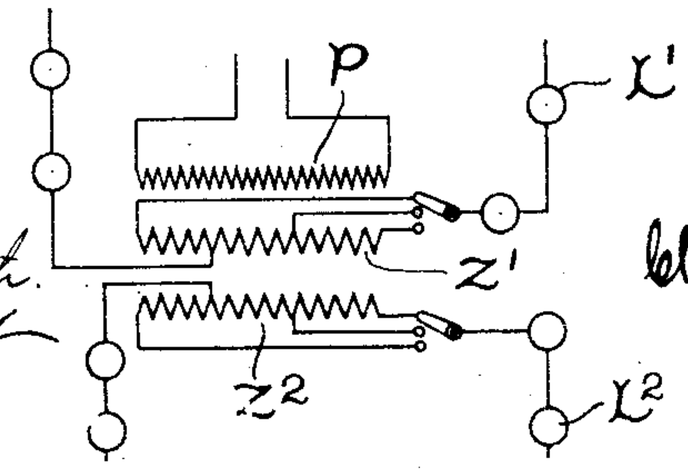


FIG. 2.



WITNESSES.

Raymond H. Danforth.

John H. Pitbney

INVENTOR.

Charles M. Green, by Geo. R. Blodgett Atty

No. 793,188. Patented June 27, 1905.

UNITED STATES PATENT OFFICE.

CHARLES M. GREEN, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SYSTEM OF ELECTRICAL DISTRIBUTION.

SPECIFICATION forming part of Letters Patent No. 793,188, dated June 27, 1905.

Application filed November 3, 1897. Serial No. 657,237.

To all whom it may concern:

Be it known that I, CHARLES M. GREEN, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Systems of Electric Distribution, of which the following is a specification.

In the drawings annexed, Figure 1 is a diagram representing my improved system by the usual conventional symbols. Fig. 2 shows a modification.

In this system, A represents an alternating-current machine supplying mains 1 1 and which may supply transformers in multiple arc in the usual way, the transformer-secondaries working lamps or other translating devices. From such a system of constant-potential alternating current branches may be taken through translating devices connected in series. Thus forty incandescent lamps of twenty-five volts each may be connected in each branch. This system is in commercial use. In the present improvement the application of the series connection in the system is extended without, however, increasing the potential at any point between the mains or between the mains and earth. This I do by introducing upon the series circuit at some point—for example, the middle or nearly the middle of the circuit—a boosting-potential which may be sufficient to carry an additional load. In this way eighty lamps can be connected in series. The potential difference found at any point on the system will not exceed that proper for forty lamps connected in the ordinary way, fewer branches will be required to leave the constant-potential lines for any given load, and fewer regulating devices will be needed to keep the system properly balanced.

In Fig. 1 suitable fuses F are inserted in the lines from the alternating-current system and switches S′, connected in the usual way. A branch or branches *a a′* from one side return at the other side at *b b′* and include a series of lights L L′ L^2 L^3. The two series L and L′ are on one branch, beginning at *a* and ending at *b*, while the two series L^2 L^3 are also on the line beginning at *a′* and ending at *b′*, suitable fuses F F being inserted at various points in the circuit, and ammeters A′ A^2 may be put upon the series lines for indicating the normal current strength. In each series are placed the usual switches, as at S^2 S^3, provided with excess-lamps or artificial resistances R′ R^2, whereby if the current varies it may be restored to the normal value. To this system I add a constant-potential primary P, connected directly across the alternating-current mains supplying the system and supplying one or more secondary coils Z′ Z^2. The potential of these secondary coils is proportioned to whatever excess of lamps has been added above the number which the system itself would have run had there been no boosting action at Z′ Z^2. If the capacity of the secondaries Z′ Z^2 in potential and current is such as to work, say, forty lamps, while the system itself could take care of fifty lamps, then each series system as constituted in the present invention and shown in Fig. 1 would operate eighty lamps in series. In this case the load must be divided nearly equally on the two sides of the boosting-secondaries Z′ Z^2 in order that there shall not be at any time an excess of potential between different points of the system over that which would work any single series—say forty lamps—determined upon as the maximum number desirable for preserving safety and insulation.

The system above outlined may be extended by again boosting by another secondary in each series, so that the load will be divided into three sections, with two boosting-secondaries between them or on each side of the middle section, and this would further extend the system and the applicability of the invention to the working of, say, one hundred and twenty lamps in series instead of forty, while still maintaining as a maximum difference of potential that potential which would be required for only forty lamps and which had been decided upon as safe and desirable.

An added advantage in my invention is that fewer extensions from the station are required in circuits, and the regulating devices are also

less in number. In other words, the load on the system may be doubled, trebled, or quadrupled without increasing correspondingly the complexity of the connections or the regulating mechanism.

Obviously the system permits the lowering of the potential between parts of the circuit which may be connected in which the number of lights is less than double what would be used in series in the ordinary connection—that is to say, if the ordinary arrangement permitted the use of, say, forty lights in series in the present improved arrangement if the number of lights is less than eighty there is a corresponding diminution in potential. Thus if sixty lights be connected in the manner described the maximum potential between any two points of the lamp-circuit would be that due to thirty lights, and so on in like manner.

Fig. 2 shows that in an arrangement like Fig. 1 the secondaries Z' Z^2 may be sectional and with contacts such that one or more sections may be included in circuit with the lights L' L^2, or by reversing the connections, as in Z', a counter electromotive force may be impressed upon the lines having the lights L' and its amount varied in case the number of lamps is to be diminished below the full number. This arrangement makes the system flexible for a varying number of lights, while economy of operation is secured. The difference in the number of lights is not compensated for by other lamps or an artificial resistance at R' R^2, but by an adjustment of the initial electromotive force at the same time that the functions of the resistances R' R^2 are preserved in case lights are extinguished accidentally or otherwise.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a system of distribution, the combination with constant-potential mains, of a branch circuit across the mains containing translating devices in series, and a source of electromotive force interposed between translating devices in said branch-circuit mains for "boosting" the potential of the branch circuit, as described.

2. A system of distribution comprising the combination, with constant-potential mains, of translating devices connected in series across the mains and requiring for normal operation a total voltage in excess of that of said mains, and a source of electromotive force interposed between translating devices.

3. In a system of distribution, the combination with constant-potential mains, of a series circuit of translating devices connected across the mains, and means in series with and between translating devices for adjusting the electromotive force in the series circuit of the translating devices in series, as described.

4. In an alternating-current system, the combination with constant-potential mains, of translating devices connected in series across the mains, the total voltage required by the translating devices in normal operation being in excess of that of the mains, and a boosting-transformer having its primary in shunt to the mains and its secondary in series with the translating devices and supplying the required excess potential.

5. In an alternating-current system of electric distribution, the combination with constant-potential mains of translating devices connected in shunt-circuit across said mains and requiring for their normal operation a potential in excess of that maintained between said mains, and a "boosting-transformer" interpolated in said shunt-circuit so as to divide the working resistance into substantially equal portions on each side thereof, substantially as described.

In witness whereof I have hereunto set my hand this 9th day of September, 1897.

CHARLES M. GREEN.

Witnesses:

JOHN W. GIBBONEY,

HERMANN LEMP.