No. 670,994. Patented Apr. 2, 1901.

# J. A. MESIROFF.

## ELECTRIC LIGHTING SYSTEM.

(Application filed Apr. 30, 1900.)

(No Model.)

Fig. 1.

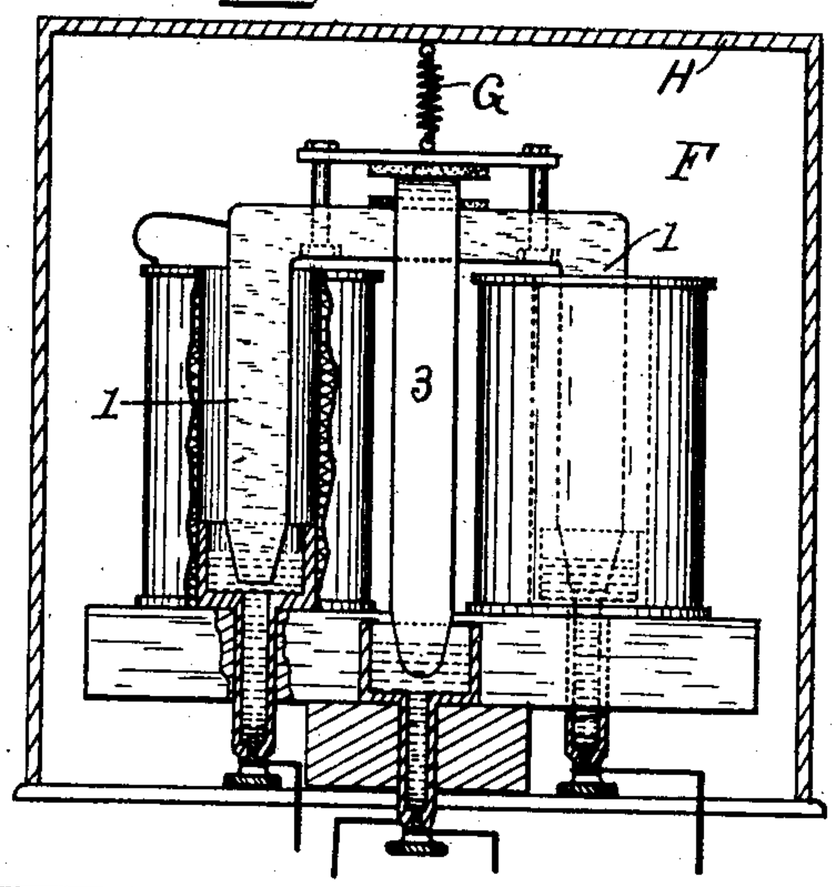



Fig. 2.

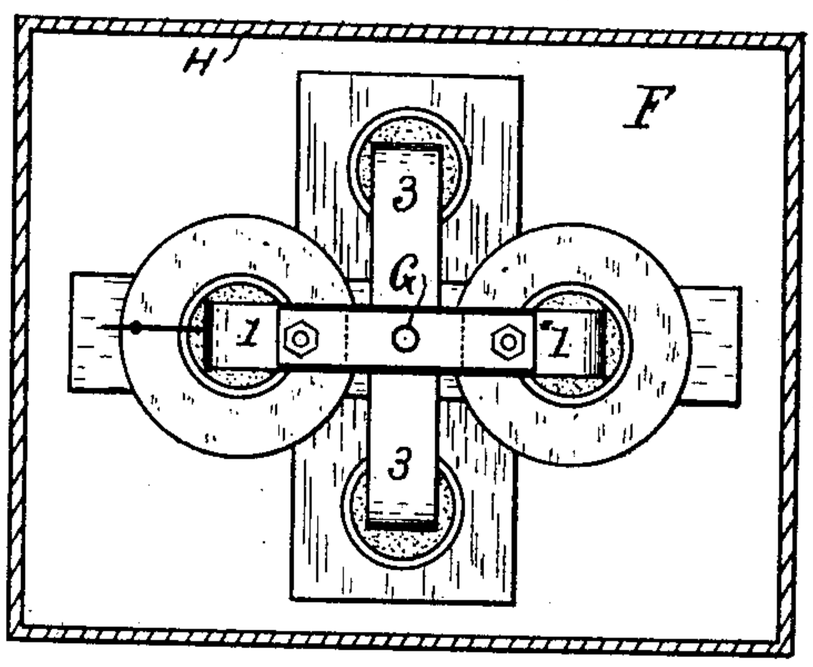



Fig. 3.

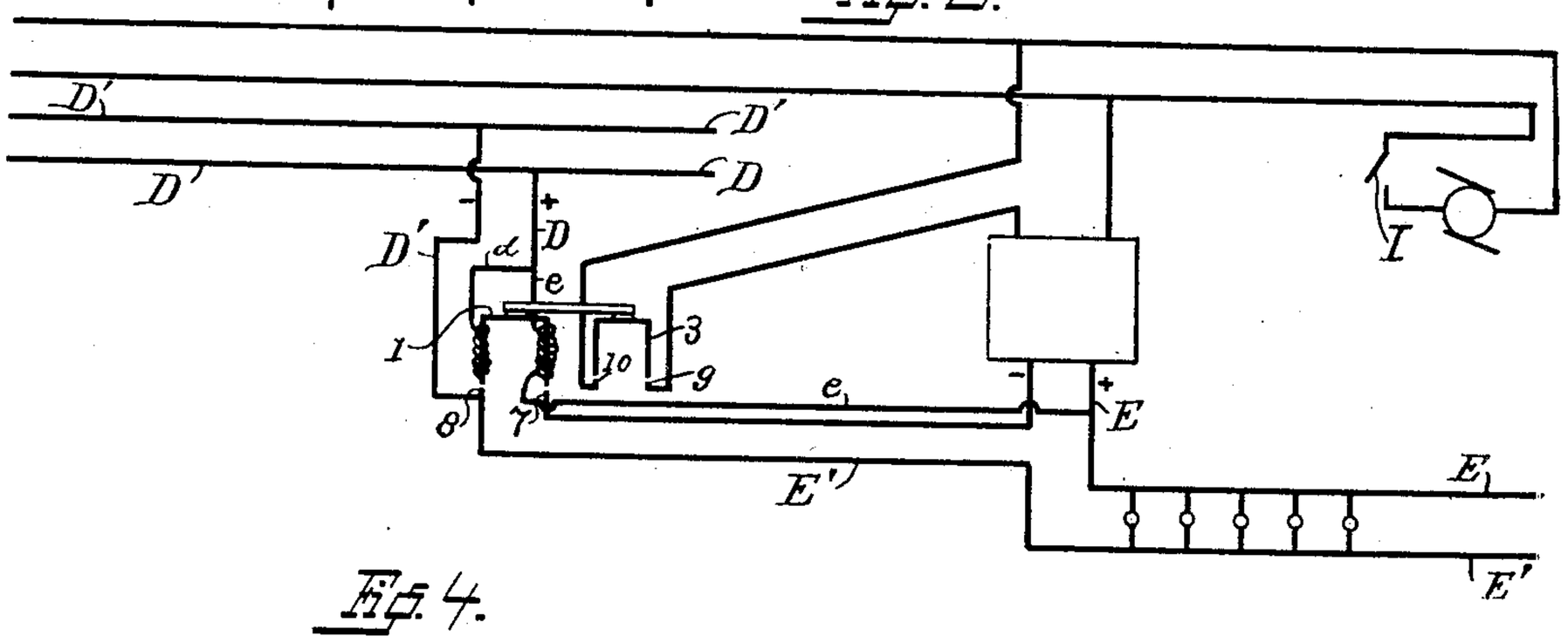
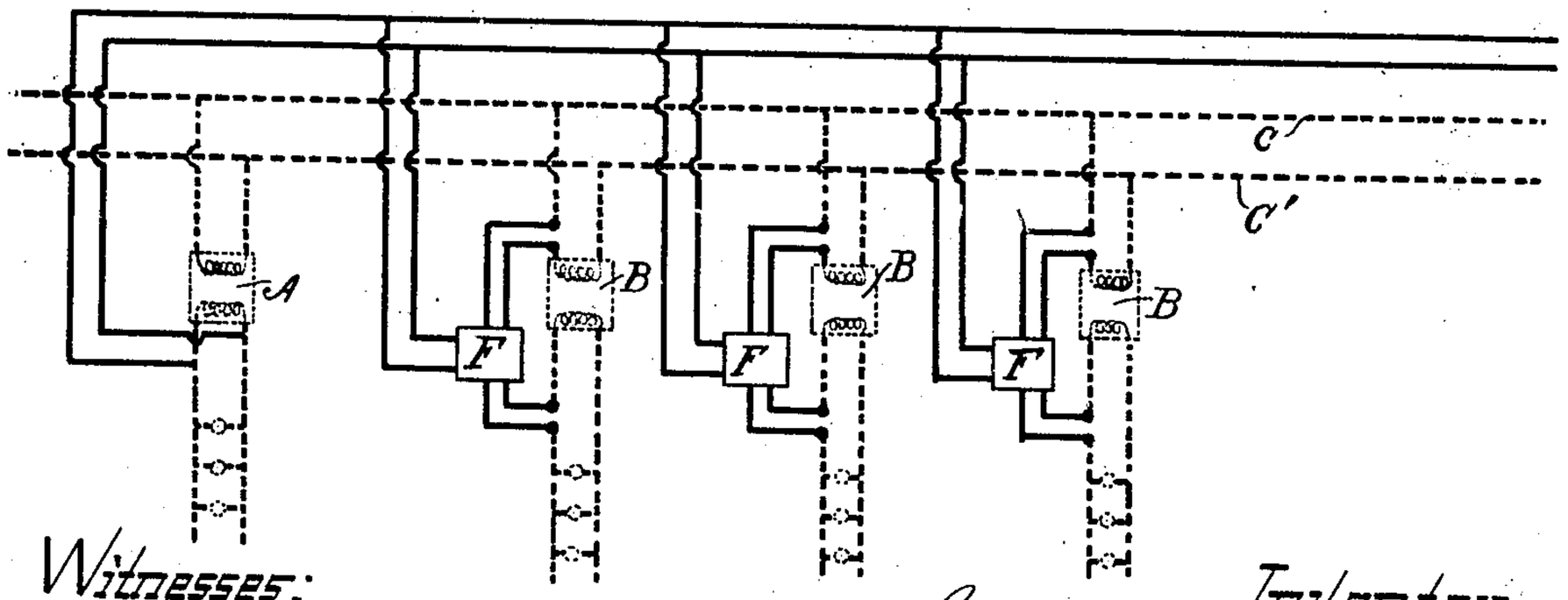



Fig. 4.

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# UNITED STATES PATENT OFFICE.

JOSEPH A. MESIROFF, OF MILWAUKEE, WISCONSIN.

## ELECTRIC-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 670,994, dated April 2, 1901.

Application filed April 30, 1900. Serial No. 14,827. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH A. MESIROFF, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Electric-Lighting Systems, of which the following is a specification.

My invention relates to improvements in alternating-current electric-lighting systems, with especial reference to the provision of automatic contact mechanism for closing and breaking the primary circuits of the transformers at the various lighting-stations.

The object of my invention is to provide means controlled through the medium of the secondary-circuit conductors of an electrical transformer for closing or breaking the primary circuit of such transformer in correspondence, respectively, with the use or the non-use of the lamps at the station to which the transformer belongs without increasing the resistance of the lighting-circuits.

In the following description reference is had to the accompanying drawings, in which—

Figure 1 is a side view of an electromagnetic circuit breaking and closing device. Fig. 2 is a top view of the same. Fig. 3 is a diagrammatic illustration of the electrical connections at one of the local stations. Fig. 4 is a more general diagrammatic illustration of a complete system, indicating three lighting-stations, to which my invention is applied.

Like parts are identified by the same reference characters throughout the several views.

In the practical application of my invention I divide the various lighting-stations of an electrical circuit into districts, each of which districts is provided with at least one transformer, which is permanently included in the primary circuit. This transformer will for convenience be hereinafter termed the "district-transformer."

Referring to Fig. 4 of the drawings, A is a district-transformer; B B B, the transformers at the several lighting-stations, hereinafter designated, for the sake of brevity, as "station-transformers." C and C′ are the conductors of the primary circuit of the lighting system, D D′ the secondary conductors of the district-transformer, and E E′ the secondaries of the station-transformers. F represents electromagnetic contact devices, one of which is located at each station with one set of electrodes in the primary and another in the secondary circuit of the station-transformer to which it pertains. Referring more particularly to the construction of these contact devices, it will be observed, Figs. 1 and 3, that an electromagnetic contact bar or core 1 of the plunger type is crossed by a U-shaped bar 3, mechanically united thereto, but insulated therefrom. The conductor D of the district-transformer is electrically connected with the winding of the electromagnet, with branch *d* in electrical communication with the left-hand arm of the core 1 and another branch, *e*, in electrical communication with the conductor E of similar polarity in the secondary circuit of the station-transformer. The contact-bars are supported by a spring G from an inclosing case H. Electrodes 7 and 8 (preferably mercurial) of the secondary circuit of the station-transformer are arranged for contact with the ends of the core 1, and similar electrodes 9 and 10 of the primary circuit of the same transformer are arranged for contact with the ends of the bar 3. When the electromagnet is energized, its core moves downwardly into contact with the electrodes 7 and 8 and the bar 3 into contact with the electrodes 9 and 10.

The operation of my invention is as follows: It has been stated that the primary circuit of the district-transformer is always closed; but when the lights are out at any station if the contact-bars 1 and 3 are in their raised position it is obvious that the secondary circuit of the district-transformer at that station will be broken by the disconnection of the lighting-switches. As soon as a light is turned on at the station, however, this circuit will be closed through the conductor D, right-hand winding of the electromagnet, electrode 7, branch *e*, the lamp, and conductors E′ and D′, and the induced current of the district-transformer traversing the winding of the electromagnet will energize the latter and cause it to move toward its fixed armature 5 and bring the bar 1 into contact with the electrodes 7 and 8; but as the contact-bars 1 and 3 are mechanically united the latter moves into contact with the electrodes 9 and 10 and closes the primary circuit of the station-trans-

former, when the induced current for lighting purposes will be immediately set up in the secondary circuit. Owing to the contact of the bar 1 with the electrodes 7 and 8 the secondary circuit is also closed through the bar, and as the conductors D, *e*, and E are of the same polarity it is obvious that the current of the district-transformer will cease to traverse the conductors E E', being in opposition to the current of the secondary circuit of the station-transformer; but the circuit of the district-transformer will then be closed through branch *d*, left-hand magnet-winding, electrode 8, and conductor D'. When all the lights are out at a station, the secondary circuit of the station-transformer is broken, but the secondary circuit of the district-transformer is still closed through the conductor D, branch *d*, the left-hand magnet-coil, one end of the bar 1, the electrode 8, and conductor D', thus holding the magnet in contact with the electrodes. By adjusting the power-house switch, however, to momentarily break the circuit of the mains the electromagnet will be deënergized, when the contact-bars will be retracted by the spring G to break the primary circuit at all stations; but as soon as the current is restored the contact devices of all stations having one or more lighting-switches still in the closed position will be at once moved into contact with their respective electrodes by the action of the district-transformer in reënergizing the magnets by the current traversing the secondary of the station-transformers, as above explained.

It will be observed that the electromagnet F of each district is in series with the district-transformer, but in parallel with all the other transformers and their respective secondaries or lighting-circuits and entirely independent thereof, except at the instant that the current of the district-transformer traverses the secondary conductors of a lighting-station pending the closing of the station-transformer. It is therefore obvious that my device will in no way vary or diminish the voltage of the lighting-circuits.

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

1. In an alternating-current electric-lighting system, the combination with the transformer of a lighting-station; of a contact device arranged to close and break the primary circuit of the transformer; an electromagnet arranged to be energized in parallel with the station-transformer for operating said contact device; and means, operating through the medium of the conductors of the secondary circuit of the transformer, to control the operation of said electromagnet.

2. In an alternating-current electric-lighting system, the combination with the transformer of a lighting-station: a source of current-supply, independent of said transformer, but having electrical connection with the lighting-switches at such station; and means, controlled by such lighting-switches, for utilizing said current to maintain a closed primary circuit of the transformer independently of the lighting-current, but during the period of use thereof.

3. In an alternating-current electric-lighting system, the combination with the transformer of a lighting-station; of an automatic circuit-breaking device for the primary circuit thereof; an electromagnet arranged to be energized in parallel with the station-transformer for temporarily holding said device in circuit-closing position; and means, controlled by the lighting-switches of said station, for energizing or deënergizing said electromagnet.

4. In an alternating-current electric-lighting system, the combination with a transformer; of a contact device or switch adapted to automatically break the primary circuit of the transformer; a source of independent current-supply; an electromagnet device in circuit therewith, and adapted, when energized, to actuate the contact device or switch, and hold the same in circuit-closing position; means for temporarily establishing the circuit of said independent current through the lighting-switches; and means for establishing a short circuit for the independent current through the magnet and contact or switch mechanism, when the latter is in circuit-closing position.

5. In an alternating-current electric-lighting system, the combination with a transformer; of a circuit-breaking device for the primary circuit thereof; an electromagnet adapted (when energized) to move said device into circuit-closing position; a source of current-supply independent of said transformer, for energizing said electromagnets; and means, controlled by the lighting-switches, for directing the current from said independent source of supply through said electromagnet, together with means, operating through the medium of the circuit-closing device, for establishing a short circuit of the independent current through the electromagnet, when the device is in circuit-closing position.

6. In an alternating-current electric-lighting system, the combination with a transformer; a second transformer having its secondary conductors in electrical communication with the secondary conductors of the first-mentioned transformer; an automatic circuit-breaking device for the primary circuit of at least one of said transformers; and means, controlled by the lighting-switches, for utilizing the current from one of said transformers to hold said switch or contact device in circuit-closing position.

7. In an alternating-current electric-lighting system, the combination with a transformer; a second transformer having its secondary conductors in electrical communication with the secondary conductors of the same polarity leading from the first-mentioned

transformer; an electromagnetic contact device for closing and breaking the primary circuit of one of the transformers; and means, controlled by the lighting-switches, for utilizing the current from one of said transformers to energize the electromagnets of said contact device.

8. In an alternating-current electric-lighting system, the combination with a transformer; of a four-point electromagnetic contact device; a second transformer having one pole connected through one winding of the electromagnet, with a conductor in the secondary circuit of the first-mentioned transformer of similar polarity, and also through the other winding of said magnet, with its corresponding contact-bar, said bar being adapted to bridge the secondary circuits of both transformers.

9. In an alternating-current electric-lighting system, a contact device for breaking the primary circuits of the transformers at each lighting-station, comprising a pair of crossed contact-bars mechanically united, but insulated from each other, and arranged with one of the bars adapted to bridge the primary circuit of its respective transformer, and the other the secondary circuit thereof; a source of current-supply, independent of said transformer, having conductors of one polarity leading through one winding of the electromagnet to a secondary-circuit conductor of similar polarity of the transformer, and through the other winding of said electromagnet to the contact-bar bridging said secondary circuit; the conductors of opposite polarity for said independent current-supply being connected with the contact-electrode of the same polarity in the secondary circuit of said transformer.

10. The combination of an electrical transformer; of an automatic circuit-breaker for the primary circuit thereof; an auxiliary transformer, an electromagnet, adapted, when energized, to actuate said circuit-breaker to a circuit-closing position; one or more switches controlling the use of the current in the secondary circuit of the first-mentioned transformer, and adapted to close the circuit of the auxiliary transformer through said electromagnet; and means for establishing a short circuit of the auxiliary transformer through the electromagnet and circuit-breaker when the latter is in circuit-closing position.

11. The combination of an electrical transformer; an automatic circuit-breaker for the primary circuit thereof; a source of independent current-supply; an electromagnet, adapted, when energized, to actuate said circuit-breaker to a circuit-closing position; one or more switches controlling the use of the current in the secondary circuit of said transformer, and adapted to also close a circuit for said independent current-supply through said electromagnet; and means for establishing a short circuit of said independent current through the magnet and circuit-breaker, when the latter is in circuit-closing position.

12. The combination of an electrical transformer; an automatic circuit-breaker for the primary circuit thereof; an electromagnet, adapted, when energized, to actuate said circuit-breaker to a circuit-closing position; an auxiliary transformer; a switch arranged to close the secondary circuits of both transformers; conductors of one polarity having a branch leading from the auxiliary transformer through one leg of said electromagnet to one polar extremity of said switch, and another branch leading through another leg of said electromagnet to one arm of the circuit-breaker; and a conductor of opposite polarity leading from said auxiliary transformer to the opposing electrodes of said switch and circuit-breaker.

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

JOSEPH A. MESIROFF.

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