(No Model.)

E. THOMSON.

TURN-OFF FOR ALTERNATING CURRENT CIRCUITS.

No. 428,647. Patented May 27, 1890.

Fig. 1.

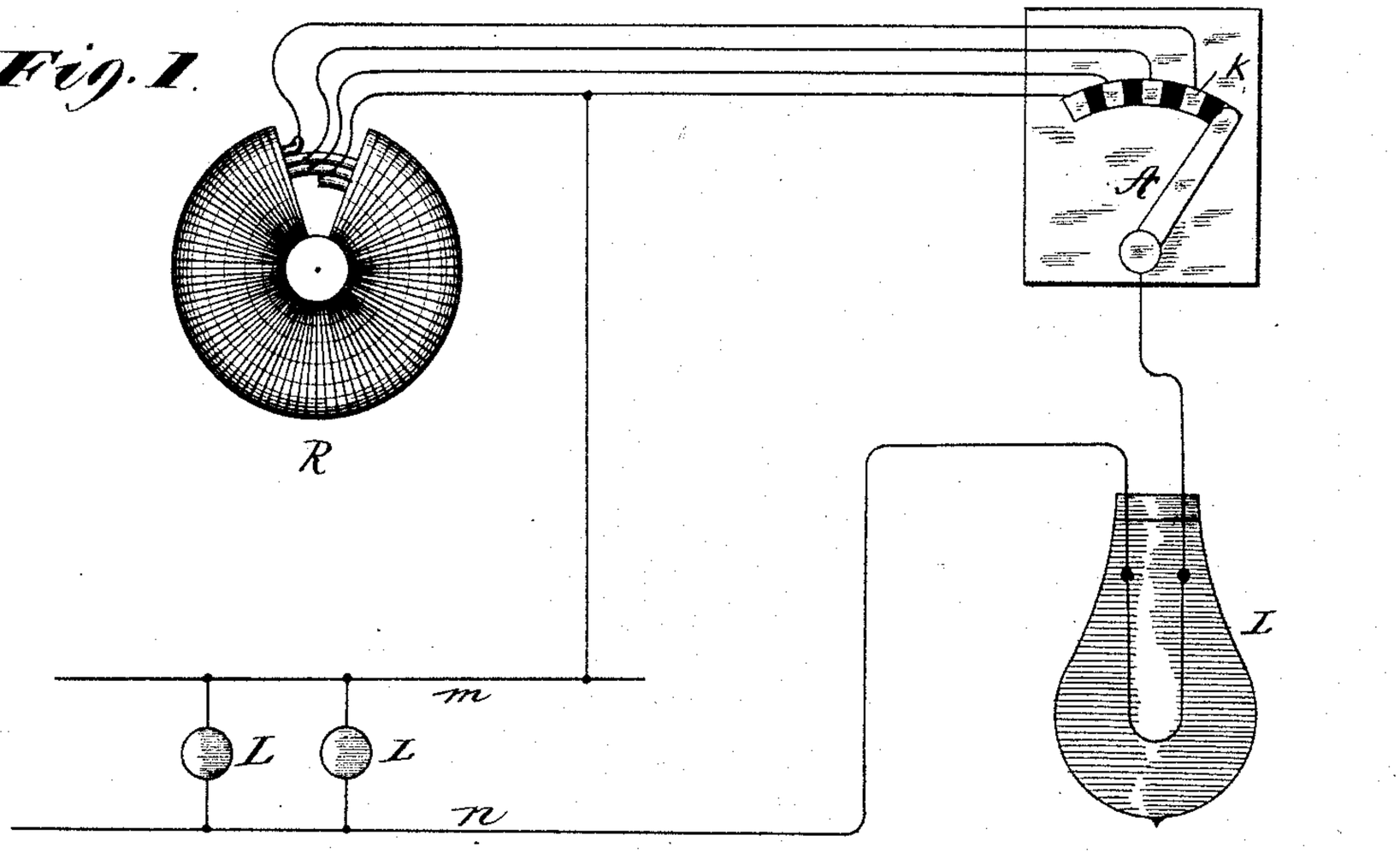


Fig. 2.

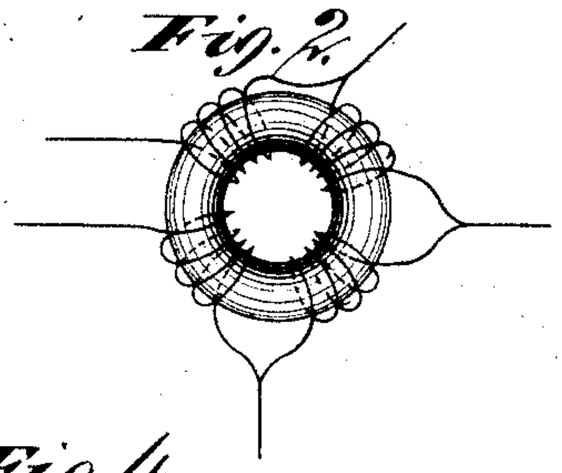


Fig. 3

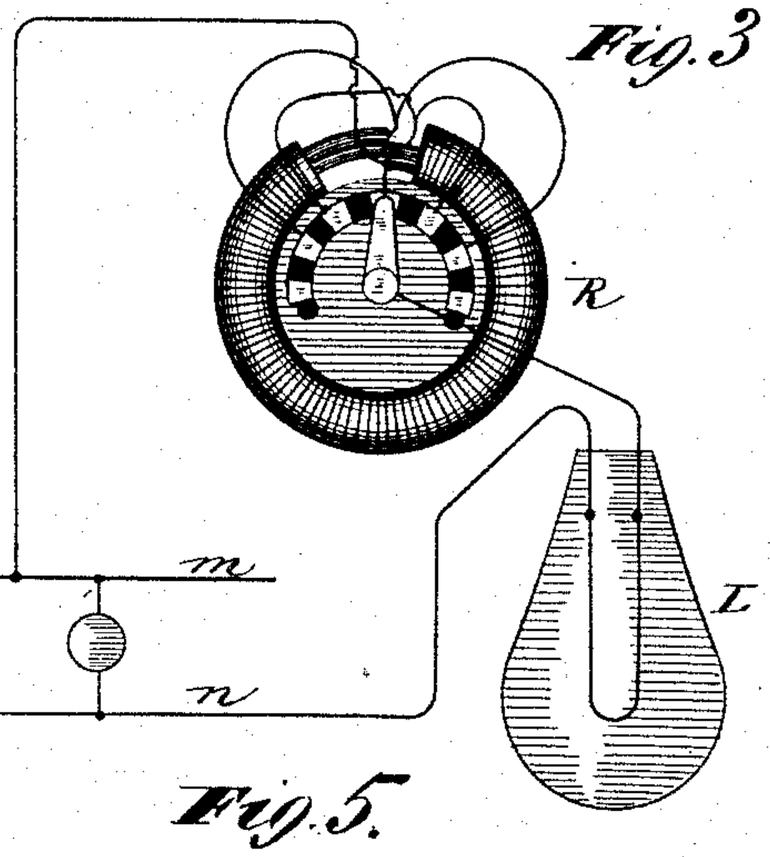


Fig. 4.

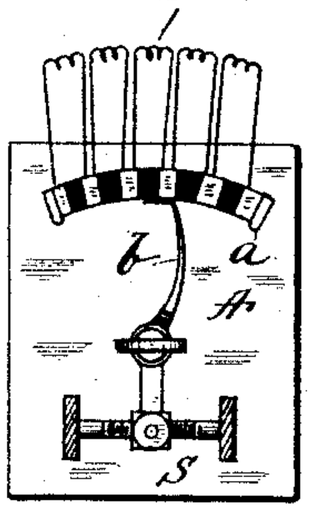
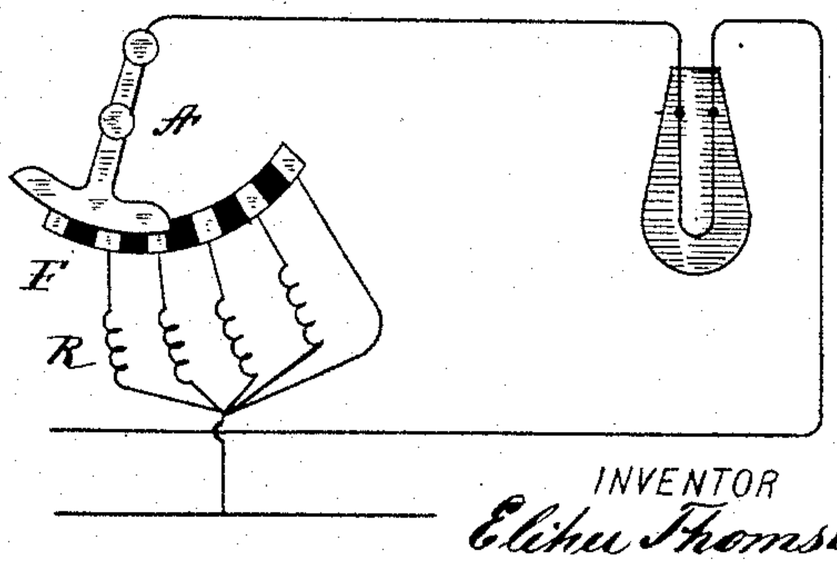


Fig. 5.



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ELIHU THOMSON, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

TURN-OFF FOR ALTERNATING-CURRENT CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 428,647, dated May 27, 1890.

Application filed March 12, 1887. Serial No. 230,725. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Turn-off for Alternating-Current Circuits, of which the following is a specification.

My invention relates to a means for controlling the action of an electric lamp or other translating device operated by electric currents.

My invention consists in the combination, with the translating device operated by alternating electric currents, of a reactive coil or counter-electro-motive-force generator and an electric switch suitably constructed to throw said generator into or out of circuit with the translating device, thereby changing the effective current through the same, and adapted at its opposite extremes of movement, as hereinafter described, to either permit the current to flow freely through the translating device without opposition from the counter-electro-motive-force generator or to cut the current off altogether from the translating device, while at the same time throwing the counter-electro-motive-force generator out of operation.

In the operation of the switch, as hereinafter described, in one of its extreme positions the circuit will be opened, so as to cut off current both from the translating device and reactive coil. At its intermediate position the reactive device will be introduced into operation in circuit with the lamp, and with a degree of reactive effect depending upon the extent of movement of the switch, while on continuation of the movement to the other extreme the reactive coil will be thrown out of action altogether, leaving the current free to flow through the translating device without opposition.

My invention consists, also, in the novel combinations and devices to be more particularly specified in the claims.

In carrying out my invention I prefer to employ as the counter-electro-motive generator a reactive coil—that is to say, a coil which by being wound on an iron core or otherwise constructed has considerable magnetic reaction and counter-electro-motive tendency when traversed by an alternating or varying current. The coil may be a sectional coil and be thrown into circuit in varying amounts with its sections in series or in multiple to vary the counter kick or reaction. The switch may cut the lamp or coil out by shunting or breaking the circuit of the same.

In the accompanying drawings, Figure 1 is a diagram illustrating my invention. Figs. 2 and 3 show modified forms of reactive coil. Fig. 4 illustrates a construction of switch device that may be employed. Fig. 5 shows a modified arrangement of the reactive coil.

Referring to Fig. 1, *m n* indicate supply-mains leading from any source of alternating current—as, for instance, from the secondary of an induction-coil—and L L indicate the incandescent lamps or other translating devices to be connected in branch circuits between the mains, so as to be traversed by the alternating current.

R indicates a reactive coil, consisting in the present instance of a coil of conducting-wire which is wrapped in a direction transverse to its circumferential axis with iron wires or a magnetic envelope of any other desired form.

A indicates the movable portion of a switch of any suitable construction that moves over a series of contact-plates, the terminal one of which *k* is connected to one terminal of the reactive coil. The other terminal of the reactive coil is connected to one of the mains, while at intermediate points in the length of said coil connections are taken in series to the contact-plates of the switch. The switch-arm A is connected to the lamp or other device and through the same with the opposite main *n*.

At the end of the series of contact-plates of the switch opposite the end at which plate *k* is located is a contact-plate connected, as shown, directly with the main *m*, so that when the switch A is on such contact current may flow directly from main *m* to the switch A and through the lamp to the opposite main *n* without passing through the reactive coil. The switch-arm A is also capable of being turned into the position indicated in the drawings, where it will be off of any electric contact, thereby opening the circuit through both the lamp and the reactive coil. In the position of the arm shown the lamp and reactive coil

are out of circuit; but as the switch is moved to the left the lamp is introduced into circuit with the whole of the reactive coil and the amount of current affecting the lamp or other translating device is cut down to an extent corresponding to the maximum reactive effect of which the coil is capable. As the switch-arm moves to the left the number of the coil-sections in circuit is successively reduced until when the arm rests on the contact-plate at the opposite end of the series the coil is completely cut out and current flows to the lamp without obstruction from the reaction of the coils. The lamp L will then burn with its full brilliancy; but by turning the switch back to the right it may be caused to burn with less and less brilliancy until finally it is put out entirely.

As before stated, a single coil might be employed and the switch constructed and arranged to throw the whole coil into and out of circuit with the lamp without any gradations of effect from the coil.

Fig. 2 illustrates a modified form of coil which is sometimes employed. In this case the conducting-wires are wound on a ring of iron and connections made from the same to the switch-contacts in obvious manner.

The switch-arm A may be mounted in front of the reactive coil, and the whole then becomes a compact and simple turn-off switch, as seen in Fig. 3; but as there shown the middle point of contact leaves the reactive coil R out, and a movement either way puts in sections of R, and finally open-circuits both R and L.

The switch-arm A may be combined with a screw S, as indicated in Fig. 4, so as to secure a gradual movement of the switch.

In order to obtain a snap-like action of the switch in leaving the final contact, which opens the circuit, I employ a spring *b*, which is attached to or moves with the switch-arm A and the part making contact with the series of contact-plates, and provide at *a* a small projection, which obstructs the elastic arm *b* at the end of the movement of switch A, so that the arm *b* will suddenly snap over and away from the final contact, when the force applied is sufficient to cause the spring *b* to pass the projection. The projection *a*, being a part of the terminal contact-plate, and of conducting material, will obviously preserve the circuit until the very moment of rupture of connection, when the snapping action will take place. This would not be the case, obviously, if such stud or projection were of insulating material, since in such instance the rupture of circuit would be liable to take place before the spring would snap off of the stud.

I prefer to make the spring *b* the circuit-closing portion, as indicated.

Fig. 5 shows coil R arranged in sections in multiple, the switch-arm diminishing the reaction by putting more sections in multiple before shunting at D and taking them out successively before open-circuiting at F. The reaction may be given to the coils by any suitable construction, as well understood in the art.

Any form of reactive coil or counter-electro-motive-force generator will answer the purposes of my invention.

What I claim as my invention is—

1. The combination, substantially as described, with a translating device supplied with alternating currents, of a switch A, adapted to be turned into open-circuit position, a reactive coil connected to a contact over which said switch may move, and a terminal contact placed at the opposite side of the first-named contact from that which the switch occupies when in open-circuit position and connected to the circuit independently of the reactive coil, so as to permit current to flow through the switch and translating device without passing through the coil.

2. The combination of a translating device on an alternating-current circuit, a counter-electro-motive-force generator, and a circuit-opening switch, all in series with one another, said switch having contacts connected to the counter-electro-motive-force generator and to a branch around the same, all as described, whereby the switch may in each of three positions respectively close the circuit through the translating device and counter-electro-motive-force generator in series, close the circuit through the translating device independently of the counter-electro-motive-force generator, and may break the circuit through both the translating device and the counter-electro-motive-force generator.

3. The combination, substantially as described, with a translating device supplied with alternating currents, of a switch A, adapted to be turned into open-circuit position, a reactive coil having sections connected to a series of contacts over which such switch may move, and a terminal contact placed at the end of the series where the reaction is least at the opposite extreme of movement of the switch to that which it occupies when in open-circuit position and connected to the circuit independently of the reactive coil, so as to permit current to flow through the switch and translating device without passing through the reactive coil, as and for the purpose described.

4. The combination, in an electric switch, of a spring-contact *b* and a terminal electric contact-stud *a*, arranged to obstruct the movement of the contact-stud *b*, so that the latter will by its resiliency snap away from the stud.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 7th day of March, A. D. 1887.

ELIHU THOMSON.

Witnesses:
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J. W. GIBBONEY.