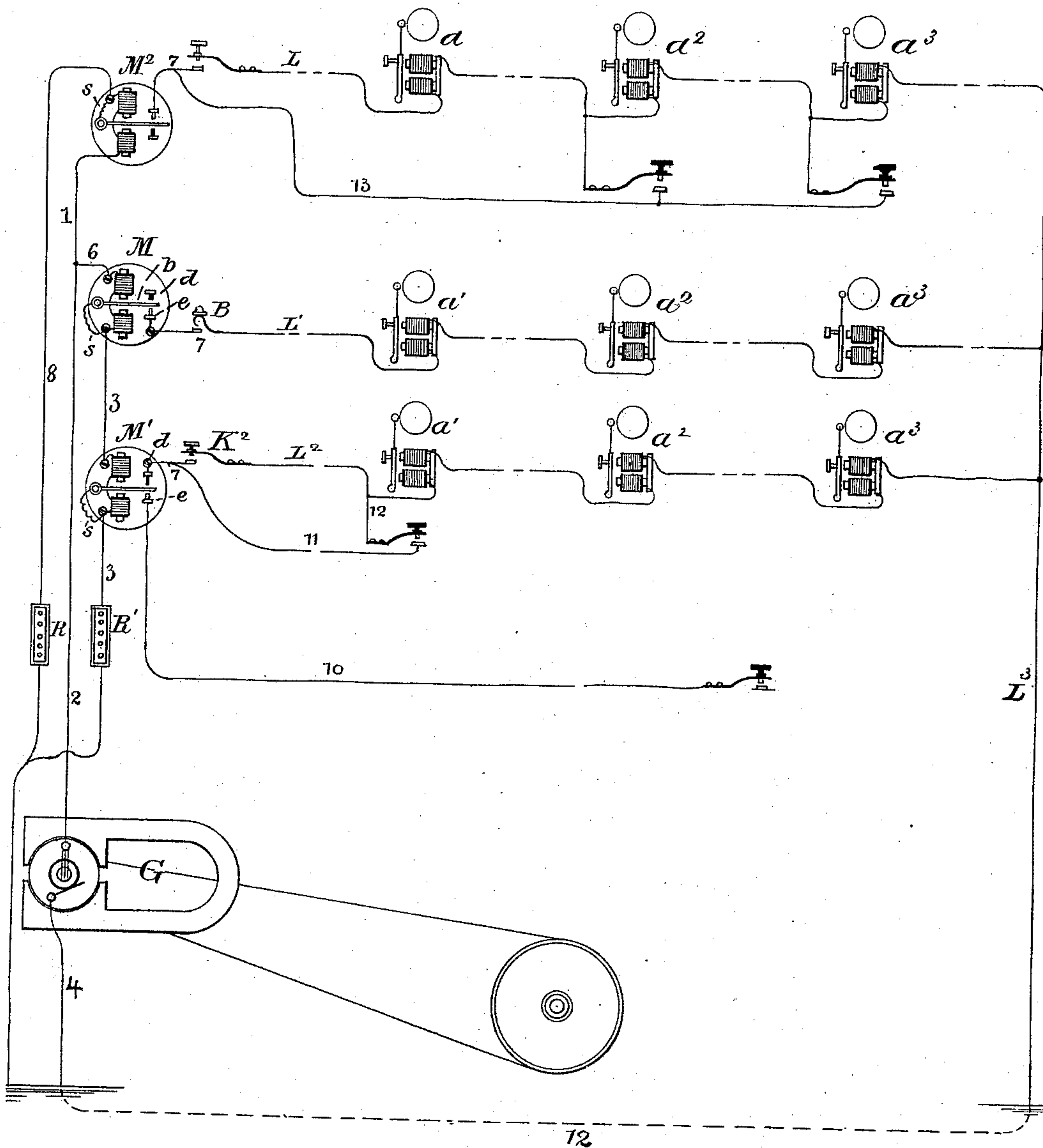


(No Model.)

T. D. LOCKWOOD.  
ELECTRIC SIGNALING CIRCUIT.

No. 314,386.

Patented Mar. 24, 1885.



Witnesses.

Geo. Willis Pierce  
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# UNITED STATES PATENT OFFICE.

THOMAS D. LOCKWOOD, OF MALDEN, MASSACHUSETTS.

## ELECTRIC SIGNALING CIRCUIT.

SPECIFICATION forming part of Letters Patent No. 314,386, dated March 24, 1885.

Application filed September 8, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS D. LOCKWOOD, of Malden, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Electric Signaling Circuits and Appliances, of which the following is a specification.

The object of my invention is to provide means whereby ordinary single-stroke electromagnetic bells may be caused to produce a continuous ring, and whereby a magneto-generator furnishing electrical pulsations of alternate direction may be employed to develop the actuating electricity without necessitating the employment of polarized bells. I accomplish these ends by a specific organization of polarized relays, resistances, and circuits, which are more particularly hereinafter described, and which are clearly shown in the accompanying drawing, which forms a part of this specification.

The drawing shows in diagram the general features of my invention.

G is a symbolic representation of a magneto-electric generator adapted to develop electric currents of successively alternating direction. It is supposed to be in a state of continuous operation, and its armature is revolved by any convenient source of power through the medium of belts and pulleys, in a manner well understood. One of the armature-coil terminals is attached to the initial ground-wire 4. To the other terminal is attached the leading-out or supply wire 2. At any suitable point on this wire a derived circuit, 6, may be branched therefrom, and this branch leads through the helices of the two polarized relay-magnets M and M', and by wire 3 and the resistance-coil or rheostat R' to earth. The resistance of this coil must be much higher than that of any bell to be served, to the end that when the service-line 2 is closed onto any bell sufficient current will pass over said bell-line to signal efficiently. Other derived circuits may in like manner be branched from the main wire 2, and I have shown a second line, I, which leads through another polarized relay, M<sup>2</sup>, and by wire 8 and resistance to ground, as before. Each polarized relay is provided with an armature, b, acted upon by both pole-pieces, and the said relay is adapted to vibrate between a pair of limit-screws, d

and e, by which its traverse in either direction is governed. I may use a conducting limit-screw on both sides, as in M', and connect a bell-circuit to each; or I may utilize but one screw for such purpose, leaving the other unattached. The other, in the latter case, might, if desired, be provided with a non-conducting tip. This, however, is immaterial; but it is essential that the two limit-screws should be insulated from one another. In each polarized relay a shunt-wire, s, is led from the outer coil-terminal, or that terminal which is most distant from the generator to the substance of the armature. In the relay M the contact-screw e only is connected with a signaling-circuit leading to a button-anvil, 7. The press-button B is united with line L', leading to the single-stroke electric bells a', a<sup>2</sup>, and a<sup>3</sup> to the distant terminal ground L<sup>3</sup>, or to the opposite pole of the generator by a return-wire, 12, if desired. These bells have soft-iron cores, and are not polarized inductively or otherwise. They respond, therefore, to an interrupted current of constant direction. In the case of the relay M<sup>2</sup> both limit-screws are utilized as signaling-circuit connections, the upper one, d, leading by wire 7 to the anvil K<sup>2</sup>, the key itself connecting with the bell-line L<sup>2</sup>.

Any number of circuit-closers, which may be press buttons or keys, as preferred, may be used with the several bell-lines, so that the bells may be operated from several different points, if desired. It is only necessary to run a branch wire as from wire 7 to a second key-anvil, and a wire, 12, from any desired point on the wire L<sup>2</sup> to a second key. The keys or buttons and anvils may, of course, be transposed, the wire 7, for example, being connected with a button or key and the line L with the anvil. The contact-point e of relay M' indicates still another wire, 10, leading to a key which is adapted to actuate another bell-line. In the system worked by the relay M<sup>2</sup>, which in other respects is identical with those which I have described, a wire, 13, is represented as leading from the main branch 7 to a key-anvil, which is operated by a key connected by wire with a point on the line beyond one or more of the bells. The design of this device is to enable the operator at that point to ring a limited number of the bells only, the bell a



being in this case excluded. It is understood that in the operation of this system the generator G is in a state of continuous rotation, and that consequently a constant succession of currents of swiftly - alternating direction are constantly being transmitted through the two closed circuits 2 and 3 and 2 and 8. The armatures of the several polarized relays respond, of course, to these changes in direction, swinging one way in response to a plus current, and the other way in response to a minus current. Moreover, as the alternations in direction in the generator-circuit are very rapid, the armatures are in a corresponding rapid state of vibration. The effect of the wires is simply to shunt a considerable portion of the electricity developed by the generator *via* the armature *b* and the contact-screws to the external circuit when the said external circuit is at any point closed. As long as the external circuits are normally open the whole of the current passes *via* the resistances to ground. But when any of the circuit-closers or keys are operated to ring a bell or a series of bells a large portion of the electricity is transferred by means of the armature to the bell-line, and inasmuch as the contact between the armature and any particular contact-screw is due to electricity of a direction adapted to swing the armature toward such screw, it is obvious that currents of the same direction only will be transferred from that screw to the line beyond; hence the bells connected upon the circuit leading from any contact-screw will receive a series of intermittent electrical currents, and will consequently ring continuously while the circuit is closed.

I am aware that it is not broadly new to ring bells by magneto-currents, and I do not broadly claim apparatus adapted for that purpose. The ordinary magneto-machine used almost universally as a telephone-signal is a well-known example. It is, however, requisite to use polarized bells in combination with such a device in order to obtain a useful effect if the bells are connected in direct circuit, and if neutral electro-magnetic bells, such as I contemplate using, are so connected, the only result when the circuit is closed will be a slight chattering of the armatures, since the reversals of current succeed one another so quickly as to have no practical effect on the armature.

The gist of my invention lies in the combination of an alternating current-generator with single-stroke non-polarized bells in such a way that the intermitting currents of even direction delivered from one half of each revolution of the generator-armature may be successively directed through one or more bell-circuits, a continuous ring upon the bells included in said circuits, while the intermitting currents of opposite direction developed by the remaining half of each revolution may be similarly utilized to ring bells connected with a second series of circuits.

I claim as of my invention and desire to secure by Letters Patent—

1. In an electrical signaling system, a magneto-generator adapted to produce successively reversed currents, a normally-closed main circuit therefor, a normally-open derived circuit containing a circuit-closer and electric bells, and a polarized relay having its electro-magnet included in the main circuit and its armature attached to said main circuit, and provided with a contact limit-stop for said armature, the said stop being connected through the circuit-closer with the derived circuit, whereby the said derived circuit may be connected with the main at each stroke of the relay-armature in a given direction, for the purposes set forth.

2. In combination with a magneto-generator, one or more normally-open bell-circuits, keys or circuit-closers for connecting any of the said bell-circuits with the generator, and analyzing devices, as indicated, adapted to select the intermittent electrical pulsations of either direction and to direct them upon the said bell-circuits when the keys of the said bell-circuits are closed, substantially as described.

3. In a system of electric signaling, the combination of an alternating current-generator, one or more normally-closed main circuits therefor, one or more polarized relays in each main circuit, a normally-open signaling-circuit, including a series of electric bells, a key or circuit-closer for each signaling-circuit, adapted when operated to connect the said circuit with one of the armature-contacts of one of the said polarized relays, whereby successive pulsations of like direction may be transmitted over the signaling-circuit to ring the bells connected thereon, in the manner described.

4. The combination, substantially as hereinbefore described, of an alternating current-generator, one or more normally-closed circuits therefor, one or more polarized relays included in each of the said branch circuits, each of the said relays having its armature connected with the main circuit at a point external to the relay-magnet, a series of normally-open signaling-circuits, including neutral electric bells, each circuit being adapted to be connected by means of a suitable circuit-closer with one of the armature-contacts of one of the relays, so as to constitute a derived circuit from the generator, whereby the successive pulsations of the same direction may be directed over the said derived circuit, substantially as and for the purposes described.

5. The combination, substantially as hereinbefore described, of an alternating current-generator, one or more main normally-closed circuits therefor, one or more polarized relays included in each of the said branch circuits, each of said relays having its armature connected with the main circuit at a point external to the relay-magnet, a series of normally-



open signaling-circuits including neutral electric bells, each circuit being adapted to be connected by means of a suitable closer with one of the armature-contacts of one of the relays, 5 so as to constitute a derived circuit from the generator, whereby the successive pulsations of the same direction may be directed over the said derived circuit, substantially as and for the purposes described.

10 6. A magneto-generator adapted to produce electric currents of successively alternating direction, one or more closed main circuits therefor, each including one or more polarized relays and a high resistance, the armatures of 15 the said polarized relays being united with the main circuit at a point external to the relay-magnet, one or more normally-open bell-circuits for each polarized relay, each bell-circuit including a series of electric bells and having 20 a total resistance not greater than the resistance of the main circuit, together with a key or circuit-closer for each bell-circuit, whereby

the said bell-line may be united with a contact-point of one of the relays, in the manner and for the purposes specified. 25

7. The combination, with a normally-open bell-circuit, of a polarized relay acting as an analyzer of the successively-reversed currents of an ordinary magneto-machine, and one or more circuit-closers adapted to connect the 30 said bell-circuit with the local contact-point of the said relay at any desired point of the said circuit, whereby one or more of the bells may be rung to the exclusion of the others, as described. 35

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 3d day of September, 1884.

THOS. D. LOCKWOOD.

Witnesses:

GEO. WILLIS PIERCE,  
D. E. RICHARDS.