

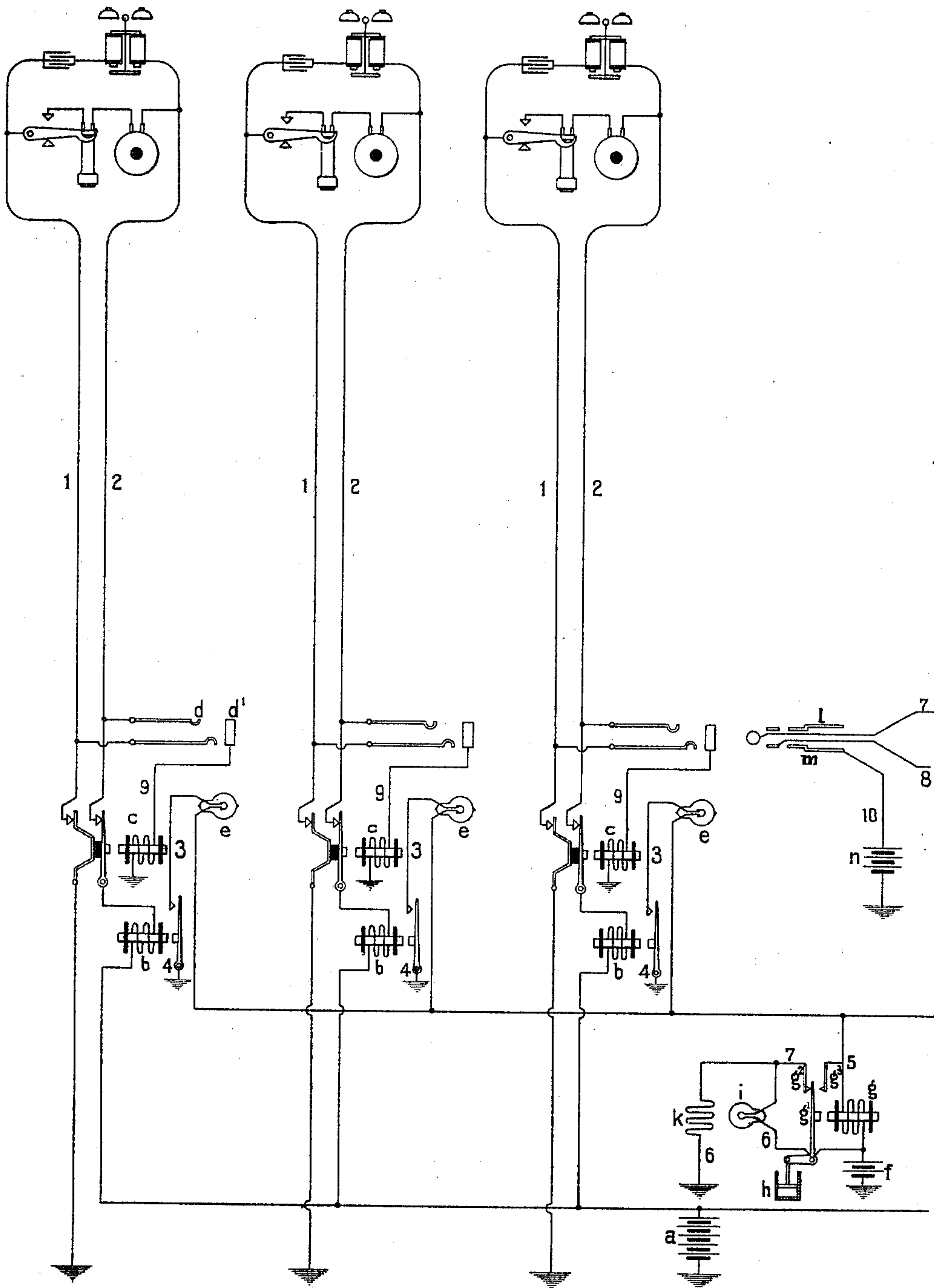
(No Model.)

C. E. SCRIBNER.

PILOT LAMP FOR TELEPHONE SWITCHBOARDS.

No. 592,452.

Patented Oct. 26, 1897.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## PILOT-LAMP FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 592,452, dated October 26, 1897.

Application filed March 11, 1897. Serial No. 626,956. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Pilot-Lamps for Telephone-Switchboards, (Case No. 445), of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

In the equipment of telephone-switchboards it is usual to provide a signal termed a "pilot-signal" in connection with a group of lines for the purpose of directing attention to the display of the smaller and less striking individual signals. This signal may be controlled by an electromagnet in a conductor common to the signaling-circuits of a number of lines. In applying the pilot-controlling electromagnet in switchboards provided with signal-lamps controlled by relays responsive to currents in the line to serve as line-signals it is desirable to place the pilot-controlling relay in a conductor common to a group of lamps; but it has been found that a magnet introduced in such a circuit interfered with the efficient operation of the lamp-signals, inasmuch as the fall of potential produced in the winding of the magnet varied with the number of lamps in the circuit, thus causing a variation in the brilliancy of the lighted lamps.

The present invention concerns pilot-controlling relays in local signal-circuits of telephone-lines and aims to eliminate the resistance of the magnet from the circuit of the lamps during the display of the lamps. It consists in the combination, with a conductor common to the local circuits of the line signal-lamps, of a relay having its magnet in the conductor, a pilot-signal controlled by the relay, and a shunt or short circuit of the relay closed through its switch-contacts when its magnet is excited, together with means for preventing the return of the armature of the relay when the magnet is thus shunted. This last-mentioned device may be an appliance for retarding the return movement of the ar-

mature whereby any rapid vibration of the armature is prevented.

The invention is shown in the attached drawing. Therein three telephone-lines are represented connected with a common central source of current-supply, each with an individual signal-controlling relay and a local circuit and secondary lamp-signal therein. The different local circuits of the lamps unite to form a conductor in common wherein the magnet of the pilot-controlling relay is interposed, the relay being constructed in accordance with this invention.

At the substations the telephone-lines are connected with the usual receiving and transmitting telephones and with a signal-bell, the circuits through these instruments being controlled by a switch and the arrangement of parts being such that the resistance between the line conductors is greatly reduced during the use of the telephone to permit the control of signals in the central office. The line conductors 1 and 2 of the different lines extend at the central office to the pole of a source *a* of current and to earth, respectively. Each line conductor 2 includes the winding of a relay *b*, designed to control a secondary line-signal. The continuity of each pair of line conductors 1 and 2 is controlled by a cut-off relay *c*, which is arranged in a local circuit which becomes closed during the use of the line, as will presently be described. Each line is connected with a spring-jack *d* in the switchboard, as usual.

Each line-relay *b* has a pair of switch-contacts, which form the terminals of two wires 3 and 4, respectively. Each wire 3 includes a signal-lamp *e*, associated with the spring-jack of the same line in the switchboard. After traversing the lamps these wires are united to form a common conductor 5, leading to a battery *f*. The wires 4, leading to the other switch-contacts of the different relays *b*, are grounded. The wire 5 includes the winding of a pilot-controlling relay *g*. This instrument may be of usual character, of moderately high resistance—say four or five ohms. The movement of its armature is re-



tarded by a light dash-pot *h*, whose piston is connected with the armature. The upper extremity of armature-lever *g'* serves as a contact-piece and plays between rear and forward contact-pieces *g<sup>2</sup>* and *g<sup>3</sup>*. The lever *g'* is connected with conductor 5, between the relay and the battery *f*. The forward contact-anvil *g<sup>3</sup>* is connected with the same wire between the relay and the group of signal-lamps. A pilot-lamp *i* is associated with the relay and is designed to be conspicuously located in the switchboard. It is included in a local circuit 6 of the battery *g*, containing also a resistance-coil *k*. The normal resting contact-anvil *g<sup>2</sup>* of the relay forms the terminal of the wire 7, which constitutes a shunt of the pilot-lamp *i*.

The usual connecting-plugs *l* are furnished in the switchboard for the use of the operator in uniting lines. The plug carries two contact-pieces, which form the terminals of the conductors 7 and 8 of the plug-circuit and which are designed to register with the springs in the spring-jack, which form the terminals of the line conductors 1 and 2 therein, and also a contact-piece *m*, which is constructed to make contact with the thimble *d'* of the spring-jack. This thimble *d'* is the terminal of a wire 9, which includes the magnet of the cut-off relay *c* and which leads to earth. The contact-piece *m* is connected with a conductor 10, leading to the battery *n*.

In initiating a connection between lines the removal of the telephone for use at the calling-station permits the telephone-switch to close a path of low resistance between the line conductors, whereupon a current flows in the line-circuit from battery *a*, which excites the line-relay *b*, thus closing the corresponding local circuit 3 4. Upon the closure of the local signal-circuit the magnet of pilot-controlling relay *g* becomes excited and attracts its armature. The forward movement of the armature breaks the shunt about the pilot-lamp *i* and brings about its illumination. The contact of the armature-lever with its forward anvil *g<sup>3</sup>* closes a shunt or short circuit about the magnet of the relay and permits a current to flow in the local circuit 3 4, which lights the secondary signal-lamp *e* of the calling-line. Thus the illumination of the conspicuous pilot-lamp calls attention to the fact of a call, while the simultaneous lighting of the smaller individual signal *e*, associated with a spring-jack in the switchboard, identifies the calling-line.

The closure of contact-lever *g'* upon its forward stop *g<sup>3</sup>* deprives the magnet-relay *g* of current and permits the retraction of the armature. The movement of the armature, however, is retarded by the dash-pot *h*, and a slow and very slight vibration of the armature results. On account of the magnetic and mechanical inertia of the parts of the relay and of the comparatively slow cooling of

the lamp *e* when deprived of current the vibration is not perceptible in the illumination of the lamp, but the presence of the relay in the circuit is appreciable only in a very slight reduction of the average potential between the terminals of the lamp *e* below the full electromotive force of the battery *f*.

It frequently happens in a telephone-switchboard that calls may be received from several stations simultaneously. If this should occur, the pilot-lamp or general signal *i* will be illuminated, as before traced, together with the individual lamps of the calling-lines. A greater current will be permitted to flow in the local circuit than if only a single lamp were lighted, but the potential between the terminals of the different lamps *e* will not be sensibly less than if but a single lamp were in circuit.

When in response to a call from any line the operator inserts the plug *l* into the spring-jack *d* of the line, the circuit 9 10 is closed through the cut-off relay, whereby the corresponding line-relay *b* is deprived of current and through its agency the local circuit 3 4 of the calling-line is broken. If but one local circuit be closed, the armature of relay *g* will return to its normal position, closing the shunt about the pilot-lamp *i*. If several lines should have called at the same time, the pilot-lamp will remain lighted until all have received attention.

My invention is defined in the following claims:

1. The combination in a circuit, of a source of current, a switch controlling the continuity of the circuit, an electromagnet in the circuit and switch-contacts actuated thereby, a short circuit of the magnet adapted to be closed by the said switch-contacts when the magnet is excited, and means for retarding the movement of the switch-lever controlled by the magnet.

2. In combination in a circuit, a signal-lamp, a source of current, a switch controlling the circuit, a relay having its magnet in the circuit, switch-contacts of the relay adapted to close a short circuit of the magnet thereof, the lever of the relay being retarded, and a signal controlled by the relay, as described.

3. The combination with a group of signal-lamps and a circuit including the said lamps in multiple together with a source of current and switches controlling the circuits through the lamps, of a relay having a winding interposed in the common circuit of the lamps and a signal controlled thereby, and a shunt of the winding adapted to be closed by the switch-contacts thereof when the relay is excited, as described.

4. The combination with a group of telephone-lines, each having means for determining the flow of current in the line in the use of the telephone and each provided with a relay responsive to such current, a local circuit



controlled by the relay and a secondary signal therein, and means for breaking the local circuit when connection is made with the line, a portion of the local circuits of the group being common, of an electromagnet in the common conductor, a signal controlled thereby, switch-contacts closed together when the magnet is excited, and a shunt about the said

magnet controlled by the said switch-contacts, as described.

In witness whereof I hereunto subscribe my name this 3d day of February, A. D. 1897.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,

DUNCAN E. WILLETT.