

No. 762,432.

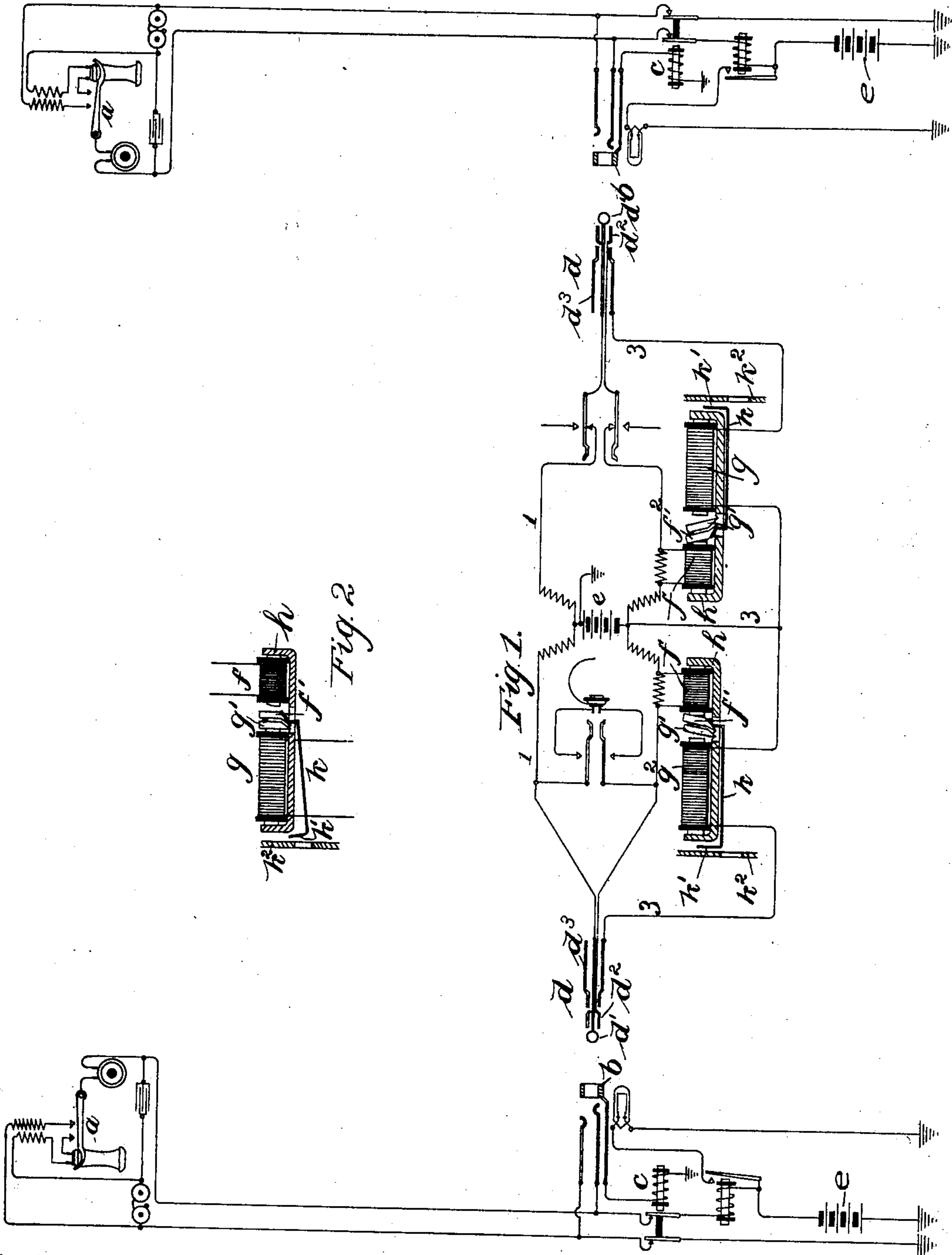
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J. L. McQUARRIE.

SUPERVISORY SIGNAL FOR TELEPHONE SWITCHBOARDS.

APPLICATION FILED MAY 9, 1902.

NO MODEL.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## SUPERVISORY SIGNAL FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 762,432, dated June 14, 1904.

Application filed May 9, 1902. Serial No. 106,567. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES L. McQUARRIE, 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 Supervisory Signals for Telephone-Switchboards, of which the following is a full, clear, concise, and exact description.

My invention relates to a supervisory signal for telephone-switchboards, and has for its object to provide an improved signal which will be especially adapted for use in connection with telephone-exchange systems where a central battery is employed to supply current to the transmitting-telephones of connected lines. In such systems the magnets which control the supervisory signals are placed in conductors of the cord-circuit in the path of current to the lines, so that these magnets are excited during the connection as long as the substation-telephones are in use, and the signal controlled by the magnet must therefore be arranged to be displayed when the magnet becomes inert; but this is the condition of the magnet when the cord-circuits are not in use and it is desired that the signal should not be displayed at such times, but should be displayed to indicate a call for disconnection while the cord-circuit is in use.

In accordance with my invention the supervisory signal is controlled through the agency of two magnet-windings, one of which is included in the path of current to the line and controlled by the substation-switch, and the other is included in a local circuit closed in making connection with the terminal switch or spring-jack of any line. The last-mentioned magnet-winding controls mechanism which normally prevents the display of the signal, so that the signal can never be displayed unless connection is made with some line. During the existence of such connection the display of the signal is dependent upon the flow of current in the other magnet-winding. The excitement of said magnet-winding causes the concealment of the signal which is displayed when the flow of current ceases.

I will describe my invention more particu-

larly by reference to the accompanying drawings, which illustrate the preferred embodiment thereof.

Figure 1 is a diagram illustrating two telephone-lines extending from substations to a central office, with a pair of plugs and their plug-circuit at the central office for uniting the lines, said plug-circuit being equipped with automatic supervisory signals in accordance with my invention. Fig. 2 is a detail view of the supervisory signal device, showing an alternative position.

The same parts are designated by the same reference characters in both figures.

The telephone-lines illustrated are of a type which is well known in the art, the equipment of the lines being such as is common for the common - battery relay - switchboard. The usual telephone-switch is provided at the substation to control the flow of battery-current in the line. The usual spring-jack or terminal switch is provided, having two line-springs connected, respectively, with the line conductors and also having a third contact or thimble *b*, which is connected to earth through the cut-off relay *c*, as is usual in such systems. The plug-circuit for connecting lines together has the usual link conductors 1 2, which unite the tip and ring contacts *d'* *d''* of each plug *d* with the corresponding contacts of its mate. Each plug has also the usual third contact or sleeve *d'*, which is adapted to register with the thimble *b* of any spring-jack into which a plug may be inserted. The grounded central battery *e* is shown connected in a bridge of the cord-circuit between the windings of a repeating-coil in the usual manner. A supervisory signal device is associated with each plug and consists of an electromagnet whose armature controls a responsive device—such, for example, as a movable indicator or target—and a second electromagnet associated with the first and serving to operate mechanism which normally prevents the actuation or display of the signal, but which is withdrawn by said second magnet when excited to leave the signal or responsive device under the complete control of the first-mentioned magnet.



The first magnet is connected in one of the conductors of the plug-circuit in the path of current from the battery *e* to the line with which the plug may be connected, and the second magnet is connected in a local circuit 3, which is completed in registering contacts of the plug and spring-jack. I have shown the two magnets *f* *g* mounted in alinement, the outer ends of the magnet-cores being united by a U-shaped yoke-piece *h*, which extends underneath the magnets and serves to support their armatures *f'* *g'*, respectively. The armatures are mounted back to back between the opposed ends of the magnet-cores, and the armature *g'* of magnet *g* is arranged to overbalance the armature *f'* and hold the latter in the position it would assume if attracted, said armature *f'* being balanced to recede from its attracted position when relieved of the weight of armature *g'*. A light arm *k* is carried by the armature *f'*, said arm extending forward underneath the yoke-piece and having at its end an indicator or target *k'*. When the armature *f'* is in its unattracted position, the target *k'* is displayed in the opening of a shield *h''* to constitute a visible signal, as shown in Fig. 2; but when said armature *f'* is in its attracted position the target *k'* is lifted above the opening in the shield, and so is concealed.

The armature *g'* serves as a locking device to prevent the display of the signal irrespective of the condition of magnet *f*; but when the magnet *g* is excited this locking means is overcome and the target will be concealed or displayed according to the excited or inert condition of the magnet *f*. When the plug-circuit is idle, the targets of the supervisory signals will be concealed, as shown in Fig. 1. When, however, a plug is inserted in the spring-jack of a line, the conductor 3, which extends from the free pole of battery *e* to the third contact *c''* of the plug, will be completed to earth by way of the thimble of the jack, into which the plug may be inserted, so that the magnet *g* will remain excited while the plug is in use. The target *k'* will then be controlled by the magnet *f*. As long as the telephone at the substation of the connected line is in use the circuit of the battery *e* will be completed through said magnet and the target *k'* will be concealed; but when the sub-

scriber replaces his telephone the flow of current through the magnet *f* ceases, so that it allows its armature *f'* to fall back, displaying the target *k'* to indicate a signal for disconnection.

I claim—

1. The combination with a telephone-line and a telephone-switch at the station thereof for changing the circuit of the line in the use of the telephone, a spring-jack for the line in a switchboard, and a plug and plug-circuit for making connection therewith, of a supervisory signal comprising an indicator, an armature connected with the indicator, and a magnet acting on said armature adapted to conceal the indicator when excited, a mechanical device independent of said armature also adapted to conceal the indicator, and a second electromagnet controlling said device, a local circuit closed in making connection with the line including said last-mentioned magnet, said first-mentioned magnet controlling the indicator being included in the telephone-line to be responsive to current therein, substantially as described.

2. The combination with a telephone-line and a telephone-switch at the station thereof for changing the circuit of the line in the use of the telephone, a spring-jack for the line in a switchboard, and a plug and plug-circuit for making connection therewith, of a supervisory signal comprising an indicator, an armature connected with the indicator, and a magnet acting on said armature adapted to conceal the indicator when excited, a mechanical device independent of said armature also adapted to conceal the indicator, and a second electromagnet controlling said device, a local circuit closed in registering contacts of the spring-jack and plug including said last-mentioned magnet, said first-mentioned magnet controlling the indicator being included in the telephone-line to be responsive to current therein, substantially as described.

In witness whereof I hereunto subscribe my name this 15th day of March, A. D. 1902.

JAMES L. McQUARRIE.

Witnesses:

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