

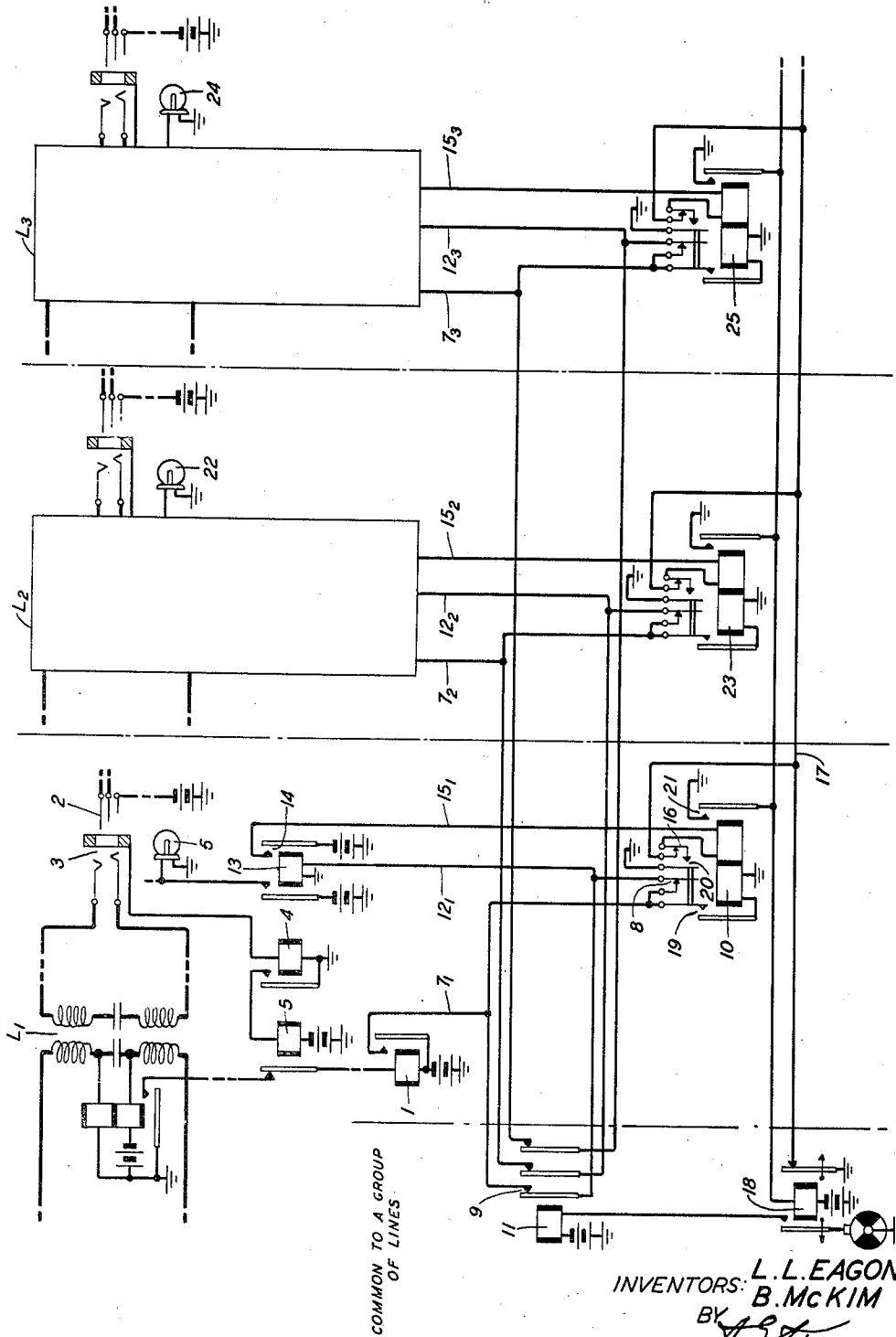
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SIGNALING SYSTEM

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SIGNALING SYSTEM

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This invention relates to telephone exchange systems and more particularly to signaling systems in which calling lines cause one or more so-called line lamps to be lighted before an operator.

An object of the invention is to indicate to the operator the seniority of waiting calls by flashing the line lamps of those calling lines which have been waiting the longest time.

A feature of the invention resides in a so-called "electrical gate" which permits all waiting lines, indicated by steadily lighted line lamps, to advance within the gate when it is opened by answering all lines already within the gate whereupon the steadily lighted line lamps of the lines so admitted start to flash and the gate is closed to subsequently calling lines until the lines now within the gate are all answered at which time the gate is again opened to admit the next group of calling lines to repeat the cycle.

The invention will be understood from the following description when read in connection with the accompanying drawing which shows three lines terminating at a telephone switchboard whose line lamp circuits are arranged in accordance with said invention.

Referring to the drawing, a relay such as 1, associated with line circuit L₁, is operated when a call arrives and is released when the operator inserts plug 2 in jack 3 to answer the call which will be obvious, i. e., the insertion of the plug closes a circuit for sleeve relay 4 which operates thereby operating relay 5 to open the energizing circuit for relay 1. Operation of relay 1 closes a circuit to light line lamp 6 which can be traced from battery, contacts of relay 1, conductor 7₁, contacts 8 and 9, in parallel, of relays 10 and 11, respectively, conductor 12₁ and winding of relay 13 to ground which latter relay energizes lamp 6, and all others which may be connected in multiple therewith at other switchboard positions.

In case no prior calling lines are waiting, the operation of relay 13 will also complete a circuit to operate gate relay 10 which can be traced from battery, contacts 14 of relay 13, conductor 15₁, right winding and contacts 16 of relay 10 to ground on conductor 17 from the right contacts of relay 18. Relay 10 operates in this circuit and locks at its contact 19 to battery on conductor 7₁ from relay 1. Immediately thereafter contacts 8 are opened, thereby opening one of the parallel paths for relay 13, followed by closure of contact 20 and the subsequent opening of contact 16. Closure of contacts 20 completes a second holding circuit for relay 10 for a purpose hereinafter referred to.

Simultaneously with the closure of contacts 19 of relay 10, contacts 21 are closed thereby causing sluggish relay 18 to operate. When relay 18 fully operates it opens its right contacts thereby removing ground from conductor 17 and at its left contacts connects interrupted ground, under control of interrupter I, to alternately operate and release relay 11. When relay 11 operates, it opens its contacts 9 thereby releasing relay 13 to extinguish lamp 6. The release of relay 13 also opens its contacts 14 which breaks one of the locking circuits of relay 10. This relay, however, is held by its left winding.

When interrupter I removes ground from relay 11, this relay is released thereby reclosing its contacts 9 and reoperating relay 13 which relights lamp 6 and at the same time recloses the second locking circuit for relay 10 which includes the right winding of that relay.

Under control of interrupter I, relay 11 alternately operates and releases thereby flashing lamp 6 at the rate determined by the speed of the interrupter which in practice may be of the order of 120 times a minute.

Now let it be assumed that before the operator answers the call on line L₁, calls are initiated on lines L₂ and L₃, the line circuits of which are identical with the circuit of L₁ but are not shown in detail. Assuming, for example, that a call arrives on line L₂, a relay corresponding to relay 1 of line L₁ operates and battery is connected to conductor 7₂ which is extended back over conductor 12₂ to cause operation of a relay, corresponding to relay 13, and the consequent lighting of line lamp 22 and the connection of battery to conductor 15₂, which, however, is ineffective to operate relay 23 due to the fact that relay 18 is operated thereby removing ground from conductor 17. In like manner a call on line L₃ causes battery to be connected to conductor 7₃ which is extended over conductor 12₃ to light the line lamp 24 and to cause battery to be connected to conductor 15₃ which, as in the case of line L₂, is ineffective to operate relay 25 due to the absence of ground on conductor 17. Line lamps 22 and 24, therefore, remain steadily lighted as long as line L₁ remains unanswered, as indicated by the flashing of lamp 6.

When the operator inserts plug 2 in jack 3 to answer the call on line L₁, sleeve relay 4 operates from battery on the sleeve of plug 2 which causes operation of relay 5. Relay 5 opens the energizing circuit for relay 1 which thereupon releases to remove battery from conductor 7₁, thereby opening the holding circuit for relay 10,

which includes its left winding, and causes the immediate release of relay 13 and the consequent extinguishing of lamp 6. When relay 13 releases the second holding circuit for relay 10, which is through its right winding, is opened and this relay then releases thereby opening, at its contacts 21, the energizing circuit of sluggish relay 18 which releases slowly. The release of relay 18 disconnects interrupter I from relay 11 and re-connects ground to conductor 17.

It will be noted as previously described, that calls are now waiting on lines L₂ and L₃ as indicated by the steady illumination of line lamps 22 and 24 but that up to this time relays 23 and 25 have not operated due to the absence of ground on conductor 17. At this time, however, when ground is reconnected to conductor 17, by the release of relay 18, both of these relays, 23 and 25, operate due to current flowing in their right windings thereby connecting ground at their right contacts to reoperate relay 18 whereupon interrupter I is again connected to relay 11, which relay changes lamps 22 and 24 from steady to flashing.

Relays 23 and 25 also lock up to battery on conductors 7₂ and 7₃, respectively, and the reoperation of relay 18 again removes ground from conductor 17 thus preventing any subsequently calling line, such as line L₁, from operating its respective gate relay, such as 10, and consequently, the line lamps of such subsequently calling line will merely light and remain lighted until the lines L₂ and L₃, whose lamps are now flashing, are answered. When both these lines, however, are answered, relays 23 and 25 are released, flashing lamps 22 and 24 are extinguished, relay 18 releases and the foregoing cycle is repeated for all line lamps which have been lighted in the meantime.

What is claimed is:

1. In a telephone system comprising a switch-board terminating a group of lines having individual signals, and having means for answering calling ones of said lines, in which a call on any line causes the energization of its respective signals and the answering of a call causes retirement of the signals, characterized by means whereby the signals of a first calling line are intermittently deenergized until retired, and the signals of all subsequent calling lines are steadily energized until the first calling line signals are retired, whereupon all steadily energized signals are intermittently deenergized until their retirement and the signals of all lines calling subsequent thereto are steadily energized until the signals being intermittently controlled are all retired.

2. In a telephone exchange system, an operator's position, a plurality of lines terminating at said position, a call signal individual to each line, a first means associated with each line responsive to a call thereover to energize the respective line signal, and a second means individual to each line, operated in response to actuation of the respective first means, to cause intermittent deenergization of the respective line signal and to disable the second means associated with all remaining non-calling lines.

3. In a telephone exchange system, a switch-board, lines having call signals terminating thereat, means responsive to the first line calling to cause the respective signal to flash until the call is answered, to cause all subsequent calling line signals to be steadily displayed until the line of the flashing signal is answered and to thereafter cause all steadily displayed signals to flash until their respective lines are answered.

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