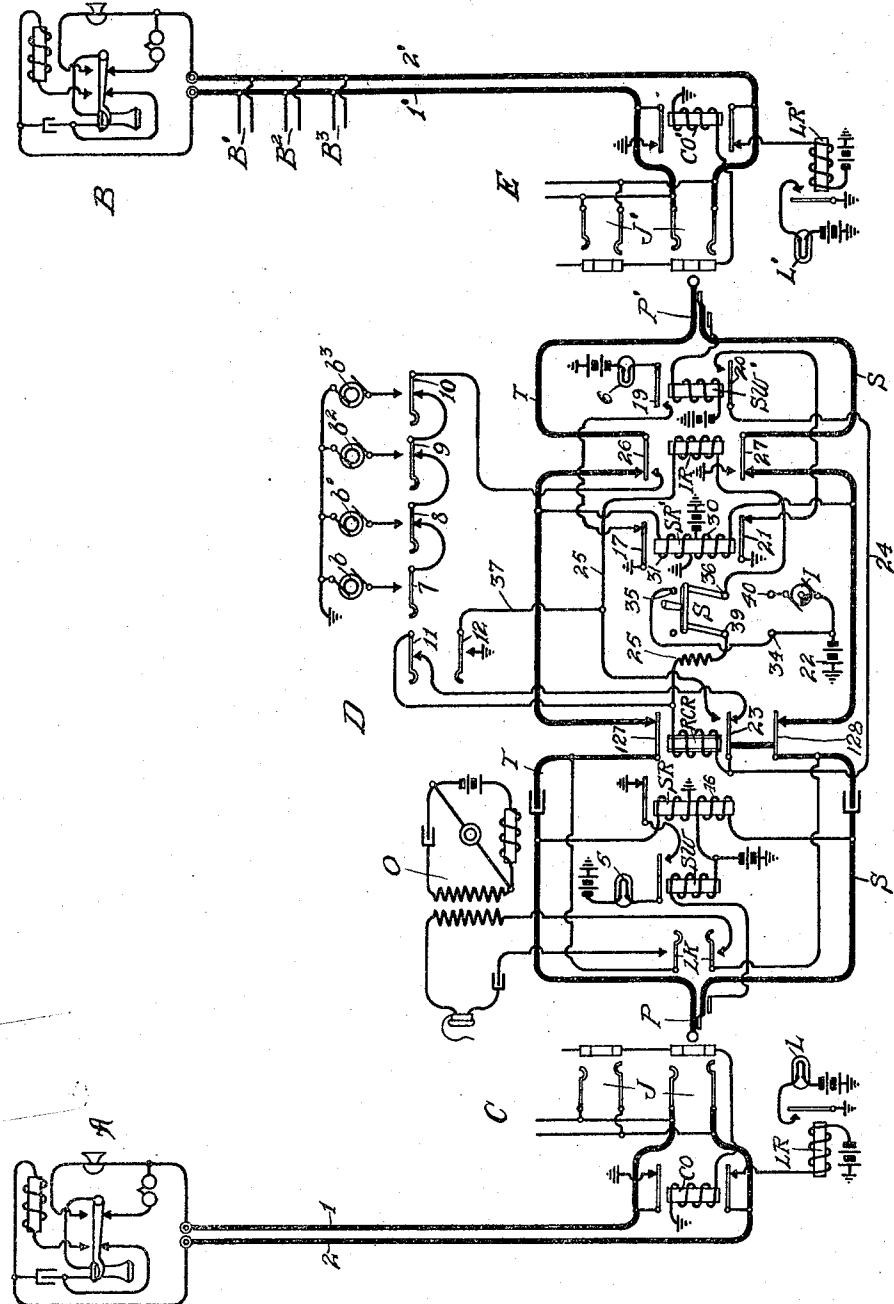


C. S. WINSTON.
TELEPHONE SYSTEM.
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Witnesses:

G. E. Mueller
Wm. Berghahn.

Inventor:
Charles S. Winston
By Curtis K. Camp
Attorney.

UNITED STATES PATENT OFFICE.

CHARLES S. WINSTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TELEPHONE SYSTEM.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES S. WINSTON, a citizen of the United States of America, residing in the city of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Telephone Systems, of which the following is a specification.

My invention relates to common battery telephone systems and is more particularly directed to means for controlling the ringing of a called-for substation, and to providing means for changing from automatic ringing to manual ringing for night service or for other occasion. An object of my invention is to provide a reliable and efficient organization of the character referred to.

Referring now to the accompanying drawings I have illustrated a circuit arrangement illustrating one form of my invention, the arrangement comprising the common battery substation A associated with a common battery line C, a cord circuit D, and a common battery substation B associated with the line circuit E, and a number of other common battery lines terminating at the switchboard in circuits line C and E are assumed.

Substation A is of a well-known common battery type connected by line limbs 1 and 2 to line circuit C, comprising cut-off relay CO and line relay LR, line lamp L and multiple jacks J. To the right of the drawing I have shown a four-party line, four substations B, B¹, B², B³, being indicated, the line terminating at the exchange in line circuit E similar to that at C.

Cord circuit D comprises answering plug P and calling plug P¹, the said plugs P and P¹ being connected by talking conductors, the talking circuit being indicated by the heavily marked conductors T and S. Associated with the answering end of the cord circuit are the switching relay SW and the supervisory relay SR which conjointly control the supervisory lamp 5. Listening key LK is provided to connect the operator's set O to the cord circuit. Associated with the calling end of the cord circuit D are switching relay SW¹ and supervisory relay SR¹, jointly controlling supervisory lamp 6.

For ringing purposes I preferably employ four generators b , b^1 , b^2 , b^3 , each one being of a different frequency, while the bells of the subscribers on the party lines are tuned

to correspond with the frequencies of the said generators. It is to be understood, however, that my invention is not limited to party lines. In ringing the called-for substation one of the contacts 7, 8, 9 or 10 is actuated depending upon the frequency of the bell of the called-for substation. The contacts 11 and 12 are master contacts associated with the ringing contacts and are closed when any one of the key plungers for contacts 7, 8, 9, or 10 is fully depressed. The ringing key plungers have three positions, normal, intermediate or locking, and fully depressed. When the key is in its fully depressed position, its ringing contact and the master contacts 11 and 12 are closed; in the intermediate or locking position its ringing contact is closed but the master contacts 11 and 12 are at normal. The ringing key plunger remains in its intermediate or locking position until another key plunger is depressed when the said locked key restores to its normal position.

A double pole, double throw switch S is provided on the power board or any other convenient place at the central office. When the switch S is in its lower position the ringing of the called-for substation is automatically controlled but when the switch S is in its upper position the ringing of the called-for substation is manually controlled. The subscriber's bell is intermittently rung when the automatic control is used by means of the interrupter relay IR, in an energizing circuit opened and closed by interrupter I, when the switch S is thrown to its position for automatic ringing, but when the switch S is in position for manual ringing the interrupter I is disconnected and the relay IR energizes from battery through the upper terminal of the switch S to ground at alternate contact 12 of the master contacts. The ringing control relay RCR is only actuated when switch S is in automatic position and when one of the key plungers is fully depressed operating the master contacts 11 and 12, whereupon the opening of contact 11 removes the shunt from around the relay RCR, permitting its energization.

Operation.

Calling subscriber A takes his receiver down from the switch-hook closing an energizing circuit for the line relay LR, line lamp L being displayed.

The operator observing the signal inserts a plug P into the answering jack J, current over the ring contact energizing the cut-off relay CO and effacing the lamp L. Upon the insertion of the plug, an energizing circuit for the supervisory relay SR is closed, traced through winding 16, conductor S, the sleeve plug and jack contacts, line limbs 2 and 1, the tip plug and jack contacts, conductor T, through the upper winding of relay SR to ground. Relays SW and SR being energized, the supervisory lamp 5 is not lighted.

The operator then throws the listening key LK and learning B is wanted, she takes the plug P¹ and tests the wanted line, touching the tip of the plug P¹ with the ring contact of the jack J¹. If the line is idle the ring contact is at a ground potential and the operator does not receive the customary busy click through her head receiver. If the wanted line is busy battery will be connected through the relay SW or SW¹ of another cord circuit to the ring contact, tested jack and through the cut-off relay to ground, and when the tip touches the ring contact, the operator will receive the customary busy click.

Assuming the called line is idle, the operator inserts the plug P¹ into the jack J¹ and an energizing circuit is established for the cut-off relay CO¹ and the switching relay SW¹ traced over the ring plug and jack contacts. Upon the energization of the switching relay SW¹, a circuit is closed through the supervisory lamp 6, traced through contacts 17--19, lamp 6 remaining lighted until the subscriber answers. The closing of contact 20 connects ground from contact 21 with relay RCR and battery 22, but the relay RCR does not energize due to the shunt circuit through 11 and 23.

Assuming switch S is thrown to its lower position (that for automatic ringing), the operator depresses the proper ringing key, say, 7 to its fully depressed position momentarily shifting the master contacts 11 and 12, the normal contact 11 opening and removing the shunt from the relay RCR, which is energized over a circuit traced from ground at 21, contact 20, conductor 24, relay RCR, resistance 25, contacts 39 and 34 to battery. The said relay RCR now remains energized due to the opening of the shunt circuit through its normal contact 23.

The relay RCR has now closed a circuit through interrupter relay IR, traced from battery 22 through interrupter I, contacts 40 and 36, relay IR, alternate contact 23, contacts 20 and 21 to ground. Intermittent energizations of relay IR actuating contact 26 connect generator *b* to the contact 7, tip conductor T thus intermittently ringing the bell of the substation.

The locking relay RCR is preferably a

slow release relay so that it may not accidentally prematurely deenergize if a substation condenser discharge should momentarily energize relays SR.

When the called subscriber answers a circuit is closed through the relay SR¹ being traced from battery through its lower winding 30, normal contact 27 of relay IR, sleeve plug and jack contacts, line limbs 2¹, 1¹, tip plug and jack contacts, normal contact 26, the upper winding 31 of relay SR¹ to ground energizing the supervisory relay SR¹, thereupon its normal contact 19 puts out supervisory lamp 6, notifying the operator that the called substation has answered. The opening of the normal contact 21 of relay SR¹ deenergizes RCR, whereupon contact 23 opens the interrupter circuit of the relay IR, preventing further energizations whereby ringing current remains excluded from the called line. The armature of relay RCR falls back closing contacts 127 and 128 restoring the continuity of the talking conductors T and S. The subscribers are now in conversation over a circuit traced by the heavily marked conductors.

When the subscribers have finished conversation they restore their respective receivers to their switch hooks, deenergizing, respectively, relays SR and SR¹ whereby lamps 5 and 6 are displayed and the operator withdraws plugs P and P¹, restoring the cord circuit and line circuit apparatus to normal.

Called line rung manually.

Assuming now that the switch S is thrown into its upper position, in which case the ringing of the called-for subscriber is manually controlled, the operation is the same as described previously up to the time that the operator presses one of the key plungers. In the manual ringing the operator presses the key plunger to its third or fully operated position closing contact 7 and operating the master contacts 11 and 12. When the master contact 12 is shifted, relay IR is energized, its circuit being traced from battery 22, contacts 35 and 36, relay IR, conductors 25, 37 to ground; the consequent closing of alternate contact 26 applying ringing current to the tip conductor of the cord circuit ringing the called subscriber as before. The operator can, if she desires, intermittently ring the called subscriber by alternately depressing and releasing the ringing key plunger. It is obvious that except when the operator actually keeps her hand on the ringing key to hold it in its third or depressed position, the called subscriber will not be rung as the plunger returning to intermediate position opens contact 12 to deenergize relay IR. Thus the features of ordinary manual ringing are presented. In this case the relay RCR is not actuated at all

as contact 39 is on open circuit. Disconnection is the same as previously described, the operator removing the plugs P and P¹ from their respective jacks to return the cord circuit D to normal making it available for other connections.

It is to be understood that the different battery and ground symbols may be one. I also do not wish to be limited to the exact structure as illustrated, as many modifications and changes can be made by those skilled in the art, without departing from the spirit of the invention, but I intend to cover such changes which come within the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. A switchboard having telephone lines, an operator's link circuit, a relay therefor controlling application of ringing current to subscribers' lines and included in circuit connections arranged for automatic or manual control thereof, and a switch for disabling the automatic control of said relay while leaving said manual control operative, said switch also being adapted to disable the said manual control.

2. A switchboard having telephone lines, an operator's link circuit and a ringing key therefor, apparatus responsive to actuation of said key to manually ring subscribers' lines, apparatus responsive to actuation of said key to automatically ring subscribers' lines, and means to disable said last mentioned apparatus, while said first apparatus is operative.

3. A telephone system including a telephone line, a source of ringing current and an operator's ringing key having two operating positions, means whereby said source is applied to said line while the operator manually holds said key in one of said operating positions, means for maintaining said key in the other operating position when actuated and released by the operator, circuit devices thereon responsive to automatically apply said source to said line apparatus, whereby the response of the called subscriber disconnects said source from the line, a switch for disabling said devices and rendering them unresponsive to said key.

4. A telephone system including a ringing relay controlling a contact through which ringing current is supplied to the called line, a manual operator's switch adapted to energize said relay at the will of the operator, a locking relay and a circuit for said ringing relay controllable thereby, means whereby the response of the subscriber unlocks said locking relay to discontinue the application of ringing current to his line, a circuit controllable by the operator for energizing said locking relay, a switch for rendering said circuit unresponsive to the operator.

5. A telephone system, including a relay having a contact directly controlling the application of ringing current to the called line, automatic means for intermittently actuating said relay, means controllable by the called subscriber for preventing further actuation of said relay to disconnect said current from his line, a switch for rendering both said means ineffective and a manual operator's switch for operating said relay for applying said ringing current while said means are ineffective.

6. A telephone system including a relay having a contact directly controlling the application of ringing current to the called line, automatic means for intermittently actuating said relay, means for manually actuating said relay, a magnet controllable by the called subscriber for preventing further intermittent actuation of said relay to disconnect said current from his line, and a manual operator's switch for rendering either of said first means ineffective and for rendering said other means effective.

7. A telephone system including telephone lines, a cord circuit for connecting to said lines as called lines, a ringing key for the cord circuit, ringing apparatus including an interrupter or ringing relay, means whereby an actuation of said ringing key will cause an operation of said ringing apparatus to associate ringing current with a connected called line for automatic control, and a manual switch having circuit connections extending to said ringing apparatus whereby the actuation of said switch will render the automatic control of the ringing apparatus inoperative and place said ringing relay and apparatus under manual control of the operator through the agency of the ringing key.

8. A telephone system including telephone lines, an operator's link circuit for connection thereto, a ringing key, an interrupter or ringing relay, a two-position manual switch having circuit connections for controlling said relay, a source of ringing current included in circuit with normally open contacts on the relay, and means whereby when said manual switch is in one position the operation of the ringing key will cause an automatic intermittent operation of the relay to apply ringing current to a connected called line and when said manual switch is in its other position said relay is actuated at the will of the operator to connect ringing current to a connected called line through its said contacts and the automatic control thereof removed.

9. A telephone system including telephone lines, an operator's link circuit for connection thereto, a ringing key, a ringing relay, a manual switch having circuit connections for controlling said relay, a source of ringing current included in circuit with contacts

on the relay, and means whereby when said manual switch is in one position a momentary operation of the ringing key will cause an intermittent operation of the relay to
5 apply ringing current to a connected called line and when said switch is in another position said relay is actuated at the will of the operator through the agency of said ringing key to connect ringing current to a con-
10 nected called line.

10. A telephone system including telephone lines, an operator's link circuit for connection thereto, a ringing key, an interrupter or ringing relay and a ringing con-
15 trol relay, a manual switch having circuit connections for varying the control of said relays, a source of ringing current, and means whereby when said manual switch is in one position an operation of the ringing
20 key will cause a continued operation of said relays to apply ringing current to a connected called line and place said relays under control thereover and when said switch is in another position said line con-
25 trol of said relays is removed and the application of ringing current to a connected called line is effected at the will of the operator through the agency of said ringing key.

11. A telephone system comprising a

called telephone line, an operator's link circuit connected thereto, a ringing key, interrupter and disconnect relays, circuit connections whereby a single operation of said ringing key energizes said relays to automatically and periodically apply ringing
35 current to the called line, an interrupter to effect such periodic applications, and a manually operated switching device whereby said interrupter circuit may be opened and whereby ringing current is applied only
40 while said key is held operated.

12. A telephone system including a telephone line, a link circuit and a ringing key therefor, apparatus controlled by the actuation of said key for manually ringing
45 said subscriber's line, apparatus responsive to the actuation of said key for automatically ringing said subscriber's line, and means for disabling said last mentioned apparatus while said first mentioned apparatus
50 is operative.

Signed by me at Chicago, in the county of Cook and State of Illinois, in the presence of two witnesses.

CHARLES S. WINSTON.

Witnesses:

G. E. MUELLER,
B. O'BRIEN.