

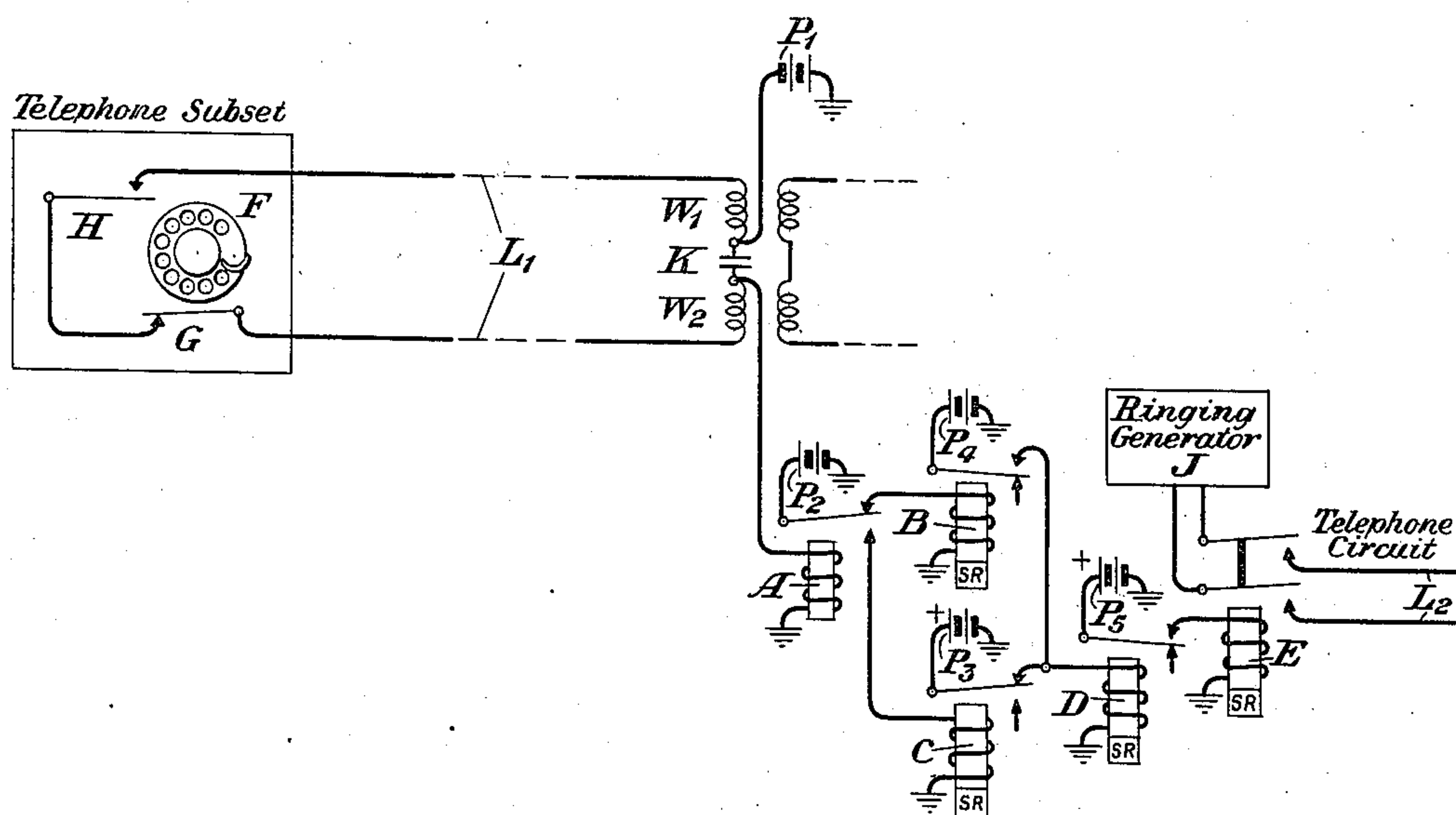
June 8, 1943.

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2,321,412

DIAL CONTROLLED SIGNALING SYSTEM

Filed Dec. 23, 1941



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2,321,412

DIAL CONTROLLED SIGNALING SYSTEM

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Application December 23, 1941, Serial No. 424,106

6 Claims. (Cl. 179—84)

This invention relates to signaling systems and more particularly to ringing systems suitable for telephone and other circuits.

This application discloses a form of ringing system suitable in the field of telephony, the system being arranged so that the application of ringing current to a line may be controlled by a dial. The dial may be located, for example, in a subscriber's office while the circuit and apparatus used for supplying the ringing current may be located at a point remote from the subscriber's office. In accordance with this invention when the subscriber dials one number the ringing current may be applied to a telephone line for a predetermined period of time, and if another number is dialed the ringing current will be applied for a different predetermined period of time.

This invention will be better understood from the more detailed description hereinafter following when read in connection with the accompanying drawing showing one embodiment of the invention merely for the purpose of illustration.

Referring to the drawing a telephone subset is symbolically shown at the left connected to a line L_1 which may be of the common battery loop type. The telephone subset—which may be located at the subscriber's office—may include, among other things, the usual switchhook H and the dial F which controls the closure of the contacts G . At the central office there may be the usual common battery P_1 which is connected to the lower terminal of the winding W_1 , the winding W_1 being connected in a series circuit with one side of line L_1 , the switchhook H , the dial contacts G , another winding W_2 and the winding of a relay A . The relay A controls the operation of two relays B and C . The relays B and C in turn control the operation of a relay D . The relay D in turn controls the operation of a relay E which when operated may be used to connect a ringing generator J , for example, to a telephone circuit L_2 .

When the subscriber at the station at the left has his receiver (not shown) on the hook H the circuit will be in its idle condition and no current will flow in the common battery circuit above referred to which includes battery P_1 , winding W_1 , switchhook H , dial contacts G , winding W_2 and the winding of relay A . This circuit will obviously be open at the contact of the switchhook H . With relay A unoperated relay B will be operated because current will flow from battery P_2 over the armature and back contact of relay A and through the winding of relay B .

As long as relay A remains unoperated relay C will remain unoperated because the circuit extending to the winding of relay C will be open at the make contact of relay A . With relay C unoperated relay D will be operated, current flowing from battery P_3 over the armature and back contact of relay C and through the winding of relay D . With relay D operated relay E will be released because the circuit of the winding of relay E will be open at the back contact of relay D . The ringing generator J will then be disconnected from the telephone circuit L_2 and, therefore, no ringing current will be applied to the telephone circuit L_2 .

When the receiver of the subscriber's set is removed from its hook H the contact of the hook H will obviously be closed, and hence current will flow from battery P_1 over the common battery circuit above described and thereby operate the relay A . In response to the operation of relay A relay C will be operated, current being supplied to the winding of relay C by battery P_2 , the circuit to relay C being completed through the armature and make contact of relay A . With the operation of relay A the battery P_2 will be disconnected from the winding of relay B and as relay B is of the slow-release type, it will in due course become released. The operation of relay C removes the battery P_3 from the winding of relay D which is also of the slow-release type. It will be observed, however, that the upper terminal of the winding of relay D is paralleled to the back contact of relay B . Therefore the operation of relay C and the release of relay B within the release interval of relay D will prevent the relay D from being released. This is because the battery P_4 will replace battery P_3 , battery P_4 being connected to the winding of relay D through the armature and back contact of relay B before relay D becomes released. In other words, relays B , C and D are so arranged that upon the operation of relay C the relay B in releasing will connect battery P_4 to the winding of relay D just ahead of the time when relay D is to release. Inasmuch as relay D remains in an operated position, relay E will remain released and no ringing current will be applied by the device J to the line L_2 .

It will be observed that the relay D will be in its operated position when the receiver is on the hook H at the subscriber's set and, moreover, that relay D will remain in its operated position after the receiver is removed from hook H . This is an important feature of this arrangement, as will appear hereinafter.

After the receiver is removed from the hook H at the subscriber's office the subscriber may then operate the dial F to apply the ringing current of the device J to the circuit L₂. As the dial F is so operated it will alternately open and close its contact G in a well-known manner and thereby interrupt the flow of current from battery P₁ over the common battery circuit extending to the winding of relay A. Relay A will, therefore, follow the pulses of the dial, releasing and operating as the contact G of the dial F is opened and closed. As the dial contact G is opened, the relay A will be released connecting battery P₂ to the winding to operate relay B. Similarly with each closure of the contact G relay A will operate to connect battery P₂ to operate relay C. The release times of relays B and C may be, for instance, about two-tenths of a second—an interval greater than the interval between the pulses produced by the rotation of the dial F. Hence relays B and C will be alternately supplied with current from battery P₂ often enough to hold both of these relays in their operated positions during the transmission of the dial pulses.

With both relays B and C in their operated positions neither the batteries P₃ or P₄ will be connected to the winding of relay D and, therefore relay D will release. In releasing relay D will connect battery P₅ to the winding of relay E to operate the latter relay. In response to the operation of relay E the ringing generator J will be connected to the telephone circuit L₂. The ringing generator J may be, for example, of a type which will supply 1000 cycle current interrupted twenty times per second, and this current may be used for ringing any party connected to line L₂. The relay E is shown to be of the slow-release type, but the slow-release feature may be eliminated if so desired.

It will be observed that the relay E is unoperated when the receiver is on hook H at the subscriber's office and remains unoperated when the receiver is removed from the hook. Relay E also remains unoperated until a predetermined interval of time after the subscriber starts to operate the dial F to open and close its contact G. After that interval of time has elapsed the relay E will become operated to apply current from the device J to the circuit L₂. The arrangement shown in the drawing, therefore, permits the subscriber to control the application of ringing current to the line L₂, ringing current being applied to the line L₂ only after the dial F has been started in rotation. In fact, the time during which the relay E remains operated is controlled by the number dialed by the subscriber. If a number such as "5" is dialed, the relay E will be operated for a predetermined period of time, and if a higher number, or the number "0" is dialed, the relay E will be operated for a longer predetermined interval of time. Thus the subscriber not alone controls the application of ringing current to the line L₂ but also the time during which the current is so applied to the line L₂.

Although the arrangement shown in the drawing has been described in connection with the application of a ringing current to a line such as L₂ under the control of a subscriber who may or may not be at a remote point, the arrangement may also be used for other purposes. If a source of direct current, for example, is employed at device J, the subscriber by operating dial F may send a pulse of direct current over the circuit L₂, the pulse being of a duration which is controlled by the number dialed by the subscriber. A short

pulse may be obtained by dialing, for example, the number "5" and a long pulse by dialing "0." Moreover, a combination of any desired number of short and long pulses may be produced by successively operating the dial F. Thus two short pulses and two long pulses may be obtained by dialing 5500. The series of dial-controlled short and long pulses may then be transmitted over the line L₂ which may be connected to a station which includes apparatus for selectively responding to the different groups of pulses transmitted over line L₂. Apparatus for selectively responding to such groups of pulses is described in applicant's copending applications, Serial Nos. 373,573 and 373,574, both filed on January 8, 1941 and may be considered a part of this disclosure. The apparatus shown in the latter copending applications responds to different combinations of pulses to selectively connect any one of a plurality of circuits or devices to a telephone or other line.

It will be apparent that relay D is operated and relay E released up until shortly after the dial F is started in operation. Thereafter relay D becomes released and relay E operated, the latter condition prevailing for a period of time which depends upon the number dialed by the subscriber. The relay E may be omitted if desired in which case the armature of the relay D may be employed to control the application of current or voltage to the line L₂ and the duration of the application of such current or voltage will be determined by the number dialed.

While this invention has been shown and described in certain particular embodiments merely for the purpose of illustration, it will be understood that the general principles of this invention may be applied to other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. The combination of a dial operated telephone subset, a main relay, means responsive to the operation of the dial of said subset to operate said main relay, said means including two auxiliary relays having their respective windings supplied alternately with current during the operation of said dial to maintain said auxiliary relays operated for a period of time which is determined by the number dialed.

2. The combination of a source of current, a line to which said source of current may be connected, and means for connecting said source to said line for a predetermined interval of time, said means including a telephone dial, a main relay, and means responsive to the rotation of said dial to operate said main relay for a period of time which is determined by the number dialed, said means including two auxiliary relays having their respective windings supplied alternately with current during the rotation of said dial to maintain said auxiliary relays operated.

3. Apparatus for controlling the operation of a circuit, comprising a main relay, and means for operating said main relay to control said circuit, said means including a movable member for opening and closing a contact regularly and successively, and means responsive to the movement of said member to operate said main relay, said main relay being operated for an interval of time which is determined by the number of times the contact of said movable member is opened and closed, said latter means including two auxiliary relays having their windings supplied

alternately with current during the movement of said member to maintain said auxiliary relays operated.

4. Apparatus for producing a pulse of current of any desired length, comprising a movable member having a contact which may be opened and closed in regular succession as said member moves, means for controlling the length of time during which said member moves, a main relay which is normally released, means responsive to the motion of said member to operate said main relay, and a circuit over which current may be transmitted, said circuit being controlled by said main relay, said latter means including two auxiliary relays which are alternately operated in succession, said auxiliary relays being supplied with current during the motion of said member to maintain said auxiliary relays operated.

5. The combination of a telephone subset including a switchhook and a dial having a contact which may be progressively opened and closed by the rotation of said dial, a first relay having its winding connected in series with said switch-

hook and said dial contact, second and third relays of the slow-release type having their windings connected respectively to the back and forward contacts of the armature of said first relay, a fourth relay of the slow-release type having its winding connected to the back contacts of both the second and third relays, and a circuit controlled by said fourth relay.

6. The combination of a telephone subset including a switchhook and a dial having a contact which may be progressively opened and closed by rotation of said dial, a first relay having its winding connected in series with said switchhook and said dial contact, second and third relays of the slow-release type having their windings connected respectively to the back and forward contacts of the armature of said first relay, a fourth relay of the slow-release type having its winding connected to the back contacts of both the second and third relays, a fifth relay having its winding connected to the back contact of said fourth relay, and a circuit controlled by said fifth relay.

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