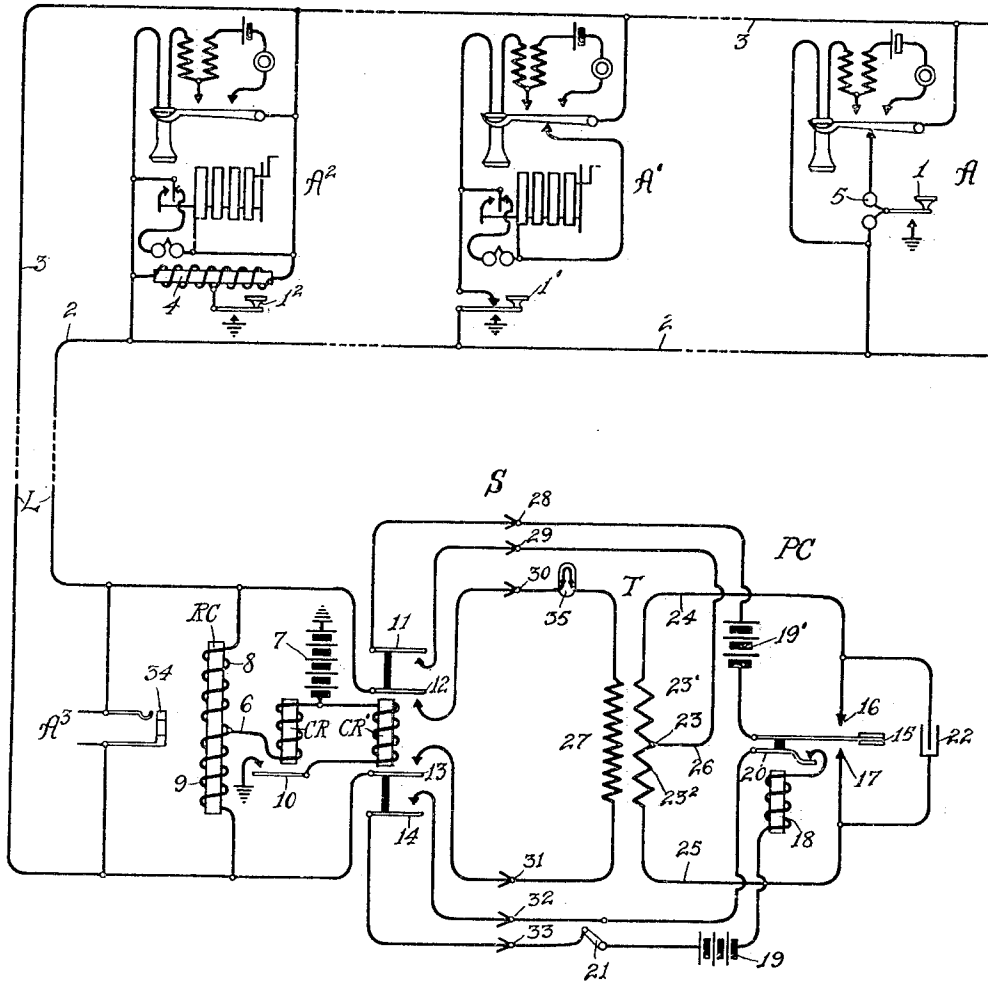


H. C. GOLDRICK.
SIGNALING SYSTEM.
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1,117,832.

Patented Nov. 17, 1914.



Witnesses:

G. E. Mueller
Wm. Berghahn

Inventor:

Harry C. Goldrick
By Curtis Blum
Attorney.

UNITED STATES PATENT OFFICE.

HARRY C. GOLDRICK, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HARRY C. GOLDRICK, a citizen of the United States of America, residing in San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Signaling Systems, of which the following is a specification.

My invention relates in general to signaling systems such as are used in signaling telephone substations, and has to do more particularly with systems of the kind in which a central source of signaling current is provided under substation control, for signaling a plurality of substations connected to the same line as is the calling substation.

I have several objects in view in providing the present invention one of which is the provision of a simplified local-battery substation telephone, and another object is to provide a central source of signaling current with simplified control circuits.

For a better understanding of my invention reference is to be had to the accompanying drawing in which a telephone line L is shown having a plurality of substations A, A¹, etc., connected thereto, and an exchange or common equipment S comprising in general, a source of signaling current provided with a pole changer PC, a transformer T, control relays CR and CR¹ and a retardation coil RC.

In general the operation of the system is such that should an operator or subscriber at a substation as A for instance, desire to signal another substation on the same line, the key 1 of the calling substation is depressed a number of times corresponding to the code ring of the wanted substation. Thus a control relay as CR common to the line is operated to effect an application of ringing current from the pole changer PC to the line L to ring the bells of all of the substations on the line, according to the operations of the key 1.

Referring now more particularly to the preferred embodiment of my invention, I have shown a single telephone line L having conductors 2, 3, and a plurality of substations A, A¹, A², and the terminals of A³ in connection therewith. Substation A² is of a well-known local battery magneto type such as is generally used for farm lines, and with the addition of a bridged impedance coil 4

and a signaling key 1². The impedance coil 4 is preferably connected in bridge of the talking conductors 2, 3, and has the signaling key 1² connected at a central point so that when key 1² is operated ground is connected to the two conductors 2, 3, through coil 4. Substation A¹ is of a type similar to that of A² but has its signaling key 1¹ arranged to connect ground to but one of the line conductors. Although I have shown these are not essential in connection with my invention but may be provided for emergency ringing. At substation A, I have shown a simplified local battery telephone in which no hand generator is provided, and in which the signaling bell 5 is connected at a central point of its winding to the signaling key 1 so that when key 1 is operated ground is connected through the windings of bell 5 to line conductors 3, 2.

Referring now to the signaling equipment S, a retardation coil RC is preferably provided being connected in bridge of the line conductors 2, 3, and having the connection extending from a central point through the winding of a control relay CR to a source of energizing current preferably in the form of a battery 7. Thus, when any of the signaling keys of the substation telephones are operated, ground is connected to the line conductors 2, 3, and a circuit then extends through the windings 8, 9 of coil RC, conductor 6, the winding of control relay CR and battery 7 to ground, energizing the relay CR. A second control relay CR¹ is also provided, being adapted to be energized when the alternate contact 10 of the relay CR is closed whereby the alternate contacts 11, 12, 13, and 14 of CR¹ are closed to effect the operation and connection of pole changer PC to the line conductors. Although I have shown two control relays CR and CR¹, it will be apparent that relay CR¹ is operated whenever relay CR is operated and one reason for providing these two relays is that but a single contact is necessary on relay CR and therefore it will be more sensitive and more readily operated over long lines with a given voltage. Of course on short lines relay CR¹ may be connected in circuit in place of CR all of which will be understood by those familiar with the art. Referring now to the preferred form of pole changer PC used, it comprises a vi-

bratile arm 15 adapted to alternately contact with points 16, 17, when operated by its motor magnet 18. An operating circuit for magnet 18 is provided comprising a battery 19 and a well-known vibratory contact arrangement 20 which is operated to interrupt the circuit of magnet 18 when it is energized. As I preferably arrange the pole changer PC normally inoperative, the operating circuit for magnet 18 is included in contacts 14 of the control relay, so that the pole changer is operated only while signaling. Of course if desired the operating circuit for magnet 18 may be maintained closed so as to operate magnet 18 continuously as by means of a switch 21. A condenser 22 is connected in bridge of the operating contacts 15, 16, 17 so as to cut down the sparking thereof while the pole changer is operating. I also preferably provide a transformer T comprising a primary winding 23 connected by conductors 24, 25, to the stationary contacts of the pole changer, said primary winding being connected at a central point by a conductor 26 which extends through the alternate contacts 11 of the control relay, a source of current supply 19¹, to the vibratile contact 15. When the pole changer is operating and contacts 15, 16 thereof are closed, a circuit is established through the primary winding 23¹, while when the contacts 15, 17 are closed a circuit is established through the primary winding 23². The primary winding and secondary winding 27 of transformer T are so related that when the current flows through the primary winding 23¹, the induced current in the secondary winding is in one direction while when the flow of current is through primary winding 23², the induced flow through secondary winding 27 is in the opposite direction. Therefore, when the contacts 12, 13 of the control relay are closed and the pole changer is operating, an alternating source of current is projected over the line conductors and through the substation bells. A protective resistance preferably in the form of an ordinary incandescent lamp 35 is connected in the signaling circuit. I have also arranged my invention so that a plurality of lines may terminate in a central office and the pole changer PC connected in common to said lines, these common connections extending from the points 28, 29, 30, 31, 32 and 33 in a manner as indicated by the common leads extending from these points. Furthermore, a jack 34 may be connected to line L and any well-known cord circuit provided for interconnecting the telephone lines centering at any exchange. The terminals A³ may be connected to an operator's telephone which may be similar to that of any of the substations shown.

Operation: Having described the general characteristics and the preferred arrange-

ments of my invention, the operation thereof will now be described. Assuming that the party at substation A desires to communicate with a party at substation A² whose code ring we will assume is two rings of its signal bell, the ringing key 1 at substation A is operated two times. Each operation of key 1 connects ground through the windings of the bell 5 to the line conductors 2, 3, windings 8, 9, of the retardation coil RC, conductors 6, and control relay CR to battery. Each closure of this circuit will of course effect an energization of relay CR whereby its alternate contact 10 is closed to energize the control relay CR¹ accordingly. Responsive to each energization of the control relays, alternate contact 14 is closed to establish an operating circuit for pole changer magnet 18 whereby the said magnet rapidly vibrates its armature and contact 15 to alternately connect with the points 16, 17. The closing of alternate contact 11 of the control relay connects the signaling source of current to the pole changer contacts so that a flow of current is alternately established through the primary winding 23¹ and 23² of the transformer T. The alternate contacts 12, 13 of the control relay having been closed to connect the secondary winding 27 of the pole changer in circuit with the line conductors, the source of alternating current set up in the secondary winding 27 is projected over the line conductors and through the call bells connected in bridge thereof. There having been two operations of the signal key 1, there would of course be two operations of control relay and therefore two corresponding connections of ringing current to the telephone line.

The control circuit established by the signaling key 1 being a simplex circuit with relation to the signaling circuit, as is well known, there is no interference between these two circuits. In response to the signal received at substation A², the party thereat will remove his receiver from the switch-hook and the party at substation A having removed his receiver preferably after the operation of key 1, the substations A and A² are connected in conversational circuit. After completing conversation the parties at the substations simply replace their receivers upon their respective switch-hooks.

Referring now to the form of substation shown at A¹, should a call be sent from said substation the signaling key 1¹ connected therewith is operated to ground one of the lines only and thus the circuit is established over conductor 2, winding 8, conductor 6 and the control relay to battery, thereby establishing a connection of ringing current to the line. Of course the operation of key 1¹ disconnects the bell of substation A¹ in this type of substation but all of the other

bells which remained connected with the line are of course operated by the connection of the ringing current to the line.

In substation A² the operation of the circuit is similar to that of substation A except that the connection from the signaling key 1² is extended through impedance coil 4 to the line conductors instead of through windings of the call bell as in A.

Although I have illustrated a preferred arrangement of the control and ringing apparatus S and several different types of substations I contemplate applying my invention in other ways also. For instance I do not desire to be limited to the use of any particular pole changer arrangement and for that matter neither do I desire to be limited to the use of a pole changer as it will be apparent that any source of alternating ringing current may be provided in place of the pole changer PC and may be connected in place of the secondary winding 27 of the transformer T so as to be connected to the line conductors through alternate contacts 12, 13 when the control relay is operated.

It will readily appear from the foregoing that by the use of my simplified ringing apparatus as S, simplified substations as A may be provided on telephone lines with a simple ringing key to take the place of expensive hand generator, and furthermore such simplified ringing being an improvement over the hand generator signaling as is now commonly used, on farmer lines for instance, a better class of service is provided and therefore a higher price can be commanded.

As referred to above I contemplate applying my invention in different forms and am aware that many changes and modifications from the system illustrated will readily present themselves to those familiar with the art and therefore I do not desire to be limited to the structure as illustrated, but aim to cover all that which comes within the spirit and scope of the appended claims.

What I claim as new and desire to secure by United States Letters Patent is:

1. A signaling system comprising a tele-

phone line, a telephone substation including signal bells connected in bridge of said line, a grounded control switch at each of said substations adapted when operated to ground the two conductors of said line, an impedance coil in bridge of said line conductors, a control relay and grounded source of current connected to a central point of said impedance coil so that said relay will be operated when any control switch is operated, and a source of alternating signaling current adapted to be connected in bridge of said conductors responsive to the operation of such control relay.

2. A signaling system comprising a telephone line, telephone substations including signal bells connected in bridge of said line, a grounded control switch at each of said substations adapted when operated to ground said line, an impedance coil in bridge of said line, a control relay and grounded source of current serially connected to a central point of said impedance coil whereby said relay will be operated when any switch is actuated, and a source of signaling current applied in bridge of said line responsive to said relay.

3. A signaling system comprising a telephone line, telephone substations including signal bells connected in bridge of said line, a grounded control switch at each of said substations for grounding said line, an impedance coil permanently connected in bridge of said line, a grounded source of current connected to a central point of said impedance coil, a source of signaling current, and means responsive to a flow of current from said grounded source over said line by the actuation of one of said keys to connect said signaling current in bridge of said line.

Signed by me at San Francisco, county of San Francisco, and State of California in the presence of two witnesses.

HARRY C. GOLDRICK.

Witnesses:

C. F. FAIRLY,
P. M. GOLDRICK.