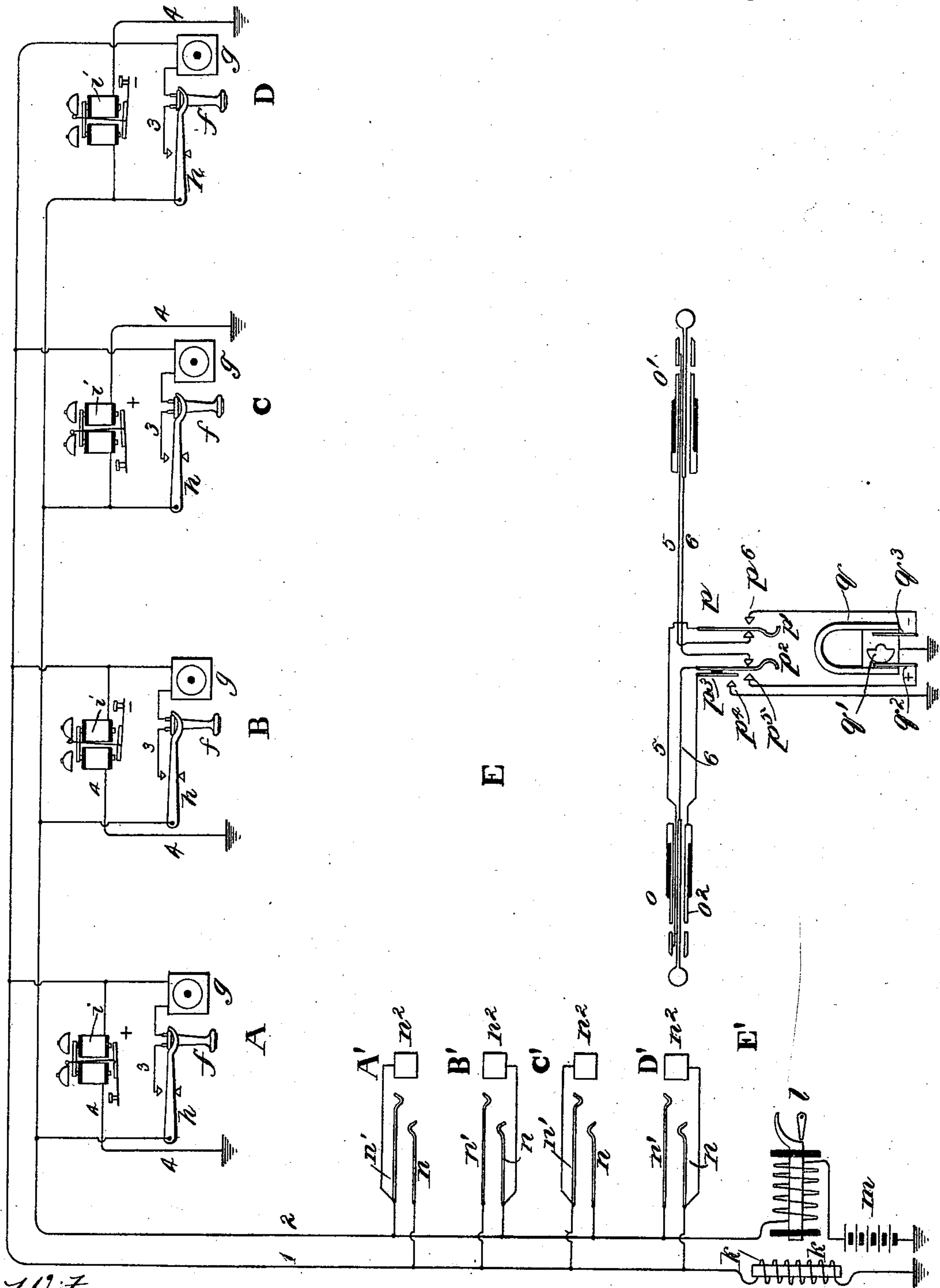


(No Model.)

F. R. McBERTY.  
APPARATUS FOR SELECTIVE SIGNAL SYSTEMS.

No. 563,294.

Patented July 7, 1896.



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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR SELECTIVE-SIGNAL SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 563,294, dated July 7, 1896.

Application filed August 23, 1895. Serial No. 560,217. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK R. MCBERTY, a citizen of the United States, residing at Downer's Grove, in the county of Du Page and State of Illinois, have invented a certain new and useful Improvement in Apparatus for Selective-Signal Systems, (Case No. 28,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to apparatus for operating selective signals of telephone-lines. Its primary object is to cause the act of making connection with the line to automatically determine the excitement of the signal to which it is desired to respond. A secondary object is to provide means for indicating to the operators the identity of the station signaled. These objects I attain by connecting with the line-circuit equipped with selective-signaling instruments at different stations a spring-jack or terminal socket at the central station for each substation, each spring-jack being provided with a device for automatically causing the operation of a single signaling instrument. The establishment of connection with a particular spring-jack of the series thus automatically determines the identity of the selective signal which will be operated, while the presence of the connecting-plug in the particular spring-jack indicates the call sent or the station signaled.

My invention is of a general nature, but may be illustrated in its use in connection with a particular mode of selective signaling—that of operating either of two reversely-polarized bells by suitably-directed current in the line, or, in extension of this latter system, of operating any of four bells connected in reversely-polarized pairs with the different line conductors of a complete circuit.

In organizing a selective-signaling system of this type, it is customary to place two bells or other responsive devices in ground branches from each side of a metallic line-circuit—as, for instance, a telephone-circuit—the two sides being normally separated. The two bells connected with each side are polarized, adapted to respond to currents of opposite directions in the circuit. In trans-

mitting signals selectively by means of such instruments a magneto-generator is employed capable of giving a pulsating current of either direction, preferably having one terminal of its armature grounded and the other adapted for connection with the signaling circuit at a moment when it is producing current of the required direction. In applying my invention in such a system, I provide four spring-jacks or terminal sockets, each having two insulated contact members, the like members of the different jacks being connected in parallel with each other to the line conductors, and I arrange in connection with each spring-jack cooperating contact-pieces and circuit connections which short-circuit or divert the current from the generator at the moment when this current is in the wrong direction for operating the desired signal, and I so arrange the connection of the line conductors with the spring-jacks that when the signaling-current is connected with any particular spring-jack only current of suitable direction for operating the corresponding signal will be transmitted over the line.

I have illustrated this form of my invention in the accompanying drawing, and will describe it more specifically with reference to the diagram.

In the drawing, A, B, C, and D designate four substations. The line conductors 1 and 2 of a metallic telephone-circuit extend to all these stations and to a central station E, where they terminate in spring-jacks. The signaling and telephonic appliances represented at the substations are of well-known type. A receiving-telephone *f* and a transmitting-telephone *g* are connected in a bridge-conductor 3 of line-circuit 1 2, which is normally interrupted at the switch-contacts of a telephone-switch *h*. A signal-bell *i* is connected permanently in a ground branch 4 from the line-circuit. This bell is a polarized bell of usual type, but is furnished with a light spring acting upon its pivoted armature to retain the latter, when the electromagnets are inert, in a predetermined position. The branches 4 at stations A and B are taken from line conductor 1; those at stations C and D from conductor 2. The springs



on the armatures of bells  $i$  at those stations at which the branches 4 are taken from the same line conductor are reversely arranged. This device permits one bell to be rung by pulsating current of one polarity or direction over the line conductor and the other bell by oppositely-directed current. The bells branched from the different line conductors may of course be operated by closing the signaling-current to the proper line conductor. This device is well known in the art and does not require further description. It may be assumed that a positively-directed current in conductor 1 will actuate the bell at station A, and one of negative polarity in the same conductor will ring the bell at station B. Likewise a positive current in line 2 will ring bell at station C and a negative current that at station D.

At the central station line conductor 1 is connected to earth through an impedance-coil  $k$ . Line-wire 2 is led to earth through an annunciator or signal  $l$  and a battery  $m$ .

It will be understood that the bells  $i$  at the substations are of such high resistance that the normal constant current from battery  $m$  through line conductor 2 and to earth through them shall be insufficient to operate the annunciator. When, however, the telephone is brought into a bridge of the circuit 1 2, for use, the current from the battery will find circuit through the annunciator, over line conductor 2, and through the bridge including the telephone at the station, returning by line conductor 1 and finding circuit through impedance-coil  $k$  to earth. A signal may thus be given to the operator at the central station.

In connection with the line conductors 1 2 are four spring-jacks, (lettered  $A'$ ,  $B'$ ,  $C'$ , and  $D'$ , respectively.) Each of these spring-jacks has a short line-spring  $n$ , a long spring  $n'$ , and a tubular thimble  $n^2$ . The springs  $n$  of spring-jacks  $A'$  and  $D'$  are connected with line conductor 1, the springs  $n'$  of the same spring-jacks being led to line conductor 2. The springs  $n$  of spring-jacks  $B'$  and  $C'$  extend to conductor 2 and springs  $n'$  of those jacks to conductor 1. The rings  $n^2$  of spring-jacks  $A'$  and  $C'$  are connected with their respective springs  $n'$ ; the rings of jacks  $B'$  and  $D'$  with their springs  $n$ .

The operator at the switchboard  $E'$  is provided with the usual plugs  $o$   $o'$ , adapted for insertion into the spring-jack, forming the terminal of a plug-circuit 5 6, which includes a calling-key  $p$ . This key  $p$ , in addition to the pair of switch-springs  $p'$   $p^2$  and their normal and alternate contact-anvils, has a spring  $p^3$ , which is adapted to register with an anvil  $p^4$  when the spring is thrust outward. The spring  $p^3$  constitutes the terminal of a contact-piece  $o^2$  of the calling-plug  $o$ , which is constructed to register with the ring  $n^2$  of a spring-jack into which the plug may be inserted. The anvils  $p^5$   $p^6$  of springs  $p'$  and  $p^2$  constitute the terminals of a generator  $q$  of alternating current. This generator is of pe-

culiar form, although it is well known in the art. It has an armature, which may be of the Siemens type, one of whose terminals is grounded permanently and the other of whose terminals is led to a semicylindrical commutator  $q'$ , which rotates between two contact-springs  $q^2$   $q^3$ . These springs are so placed with relation to the point at which the direction of the current in the armature is changed that spring  $q^2$  receives in each revolution a pulsation of positively-directed current, and the spring  $q^3$  during the other half of the revolution a negatively-directed current.

I do not deem it necessary to trace the operation of signaling from a substation to the exchange or the process of making connection there. Let it be assumed, for the purpose of illustrating the operation of this invention, that the operator wishes to signal to station A. She will insert plug  $o$  into spring-jack  $A'$  and operate the key  $p$ . A pulsatory current may now flow from the spring  $q^2$  through the contact-points  $p^5$   $p^2$ , thence through conductor 6 of the plug-circuit to line conductor 1, and thence through branch 4 and bell  $i$  at station A to ground. The bell will be operated by this current. A pulsatory current, whose pulsations occur in the intermissions of current through spring  $q^2$ , and of opposite direction, will flow out from spring  $q^3$  through conductor 5 of the plug-circuit to spring  $n'$ ; but from this point a short circuit is provided through the thimble  $n^2$  to the contact-piece  $o^2$  of the plug and thence through the contacts  $p^3$   $p^4$  of the key to earth. Hence no signaling-current will reach the line conductor 2, and the operation of the bell at station D will be prevented.

If the operator were to insert the plug into spring-jack  $B'$ , the signaling-current would flow out from spring  $q^3$  and conductor 5 of the plug-circuit to the spring  $n'$  of jack  $B'$  and thence to conductor 1 of the line-circuit, the current from spring  $q^2$  of the generator being short-circuited at spring  $n$  of the spring-jack and returning to ground through the same contact-pieces of the key as before. If the plug were inserted into spring-jack  $C'$ , the positively-directed current from spring  $q^2$  would reach the line conductor 2 and would operate the bell at station 3, the negatively-directed current being short-circuited. Similarly, the insertion of the plug into spring-jack  $D'$  would cause the operation of the bell at station D. Thus the spring-jack into which the plug is inserted determines the selective signal connected therewith which shall be operated, the character of the signal-operating current being modified or adapted by the spring-jack and its associated circuit connections for the actuation of only a particular bell.

When the operator has made a connection with any spring-jack, and has operated the signal at the corresponding station, the presence of the plug  $o$  in that spring-jack indicates to her, during the existence of the con-



nection, the station which has been signaled. If it should be necessary to signal the same station again, this may be done by operating the key *p*; or if it should be necessary to make any charge, as in the case of a toll connection, the identity of the station signaled is ascertained by the presence of the connecting-plug in the corresponding spring-jack.

The broad idea of my invention is subject to more or less extensive modifications which will occur to those skilled in the art. Numerous devices in the form of circuit connections and apparatus may be provided in connection with the spring-jacks A', B', C', and D', to adapt the current for the operation of the corresponding signal.

I claim, broadly, as new and desire to secure by Letters Patent—

1. The combination with a signaling-circuit having several selective - signaling instruments connected with the same conductor thereof, of a separate spring-jack or connection-socket for each signaling instrument connected with the circuit, a generator of signaling-current and means for applying it to any spring-jack, and a device in connection with each spring-jack adapted to determine the operation of the corresponding signal, as described.

2. The combination with a signaling-circuit, of several responsive instruments connected with the same conductor thereof, each adapted to be actuated by current of a particular character, a spring-jack or connection-socket connected with the circuit for each responsive device, means for connecting a source of current with any spring-jack, and a device in connection with each spring adapted to modify the signaling-current, when the source of current is connected with it, to operate the corresponding responsive device, as described.

3. The combination with a signaling-circuit, of several selective signals connected with the same conductor thereof, a spring-jack for each signal also connected with the circuit, a source of current for operating the signals and means for connecting it with any spring-jack, and circuit connections with each spring-jack for adapting the current through the signaling-circuit to operate the corresponding signal, as described.

4. The combination with a signaling-cir-

cuit, of a pair of oppositely-polarized responsive instruments in the circuit, two spring-jacks connected with the circuit, a source of signaling-current and means for connecting its poles with the similar contact-pieces of either spring-jack, the said contact-pieces being reversely connected with the circuit, whereby the connection of the source of current with either spring-jack determines the operation of the corresponding responsive device.

5. The combination with a metallic signaling-circuit, of a responsive device in a ground branch from each limb of the circuit, a spring-jack for each instrument connected with the circuit, a source of current and a plug for connecting its poles with similar contact-pieces of either spring-jack, said source of current being adapted to deliver current to either line conductor from a ground connection, an auxiliary contact-piece in each jack, the auxiliary contact-pieces being connected with different line contact-pieces of the two jacks, a contact-piece in the plug registering with the auxiliary contact, and means for temporarily grounding the said plug-contact, whereby either responsive device may be operated by inserting the plug into the corresponding spring-jack.

6. In combination with a metallic-circuit telephone-line, a pair of oppositely-polarized bells in different ground branches from each line conductor; four spring-jacks, each having two line-contacts connected with the line conductors, two different pairs of line-contacts being connected with each line conductor, and each having an auxiliary contact-piece connected with one of its line-contacts, a source of signaling-current and a plug for connecting it with any spring-jack; a contact-piece in the plug adapted to register with the auxiliary contact-piece of a jack into which it may be inserted, and means for grounding the said plug-contact; whereby either of the bells may be operated by inserting the plug into the corresponding spring-jack, as described.

In witness whereof I hereunto subscribe my name this 16th day of July, A. D. 1895.

FRANK R. McBERTY.

Witnesses:

ELLA EDLER,

W. M. CARPENTER.