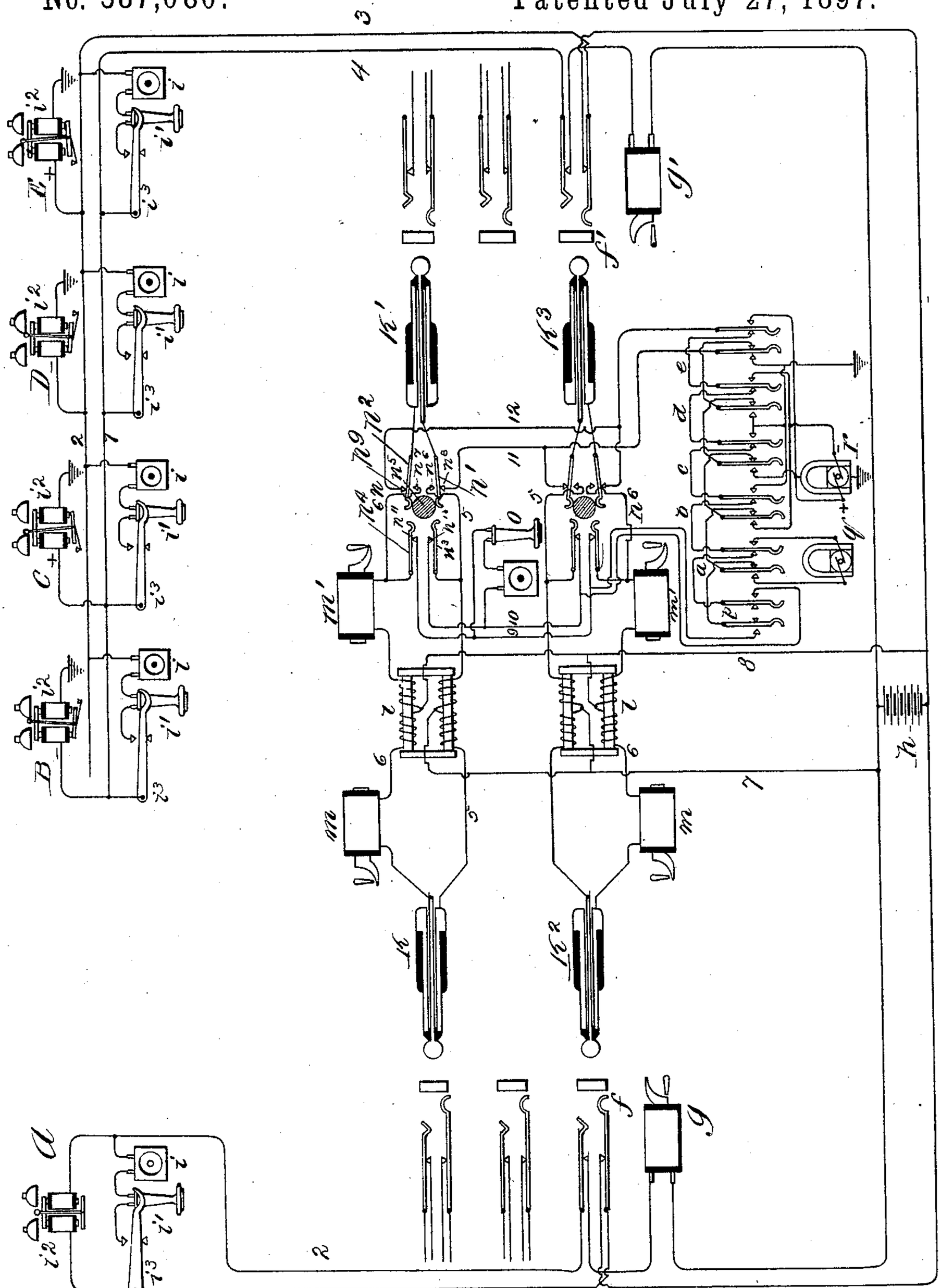
(No Model.)

F. R. McBERTY.

CALLING APPLIANCE FOR TELEPHONE SWITCHBOARDS.

No. 587,080. Patented July 27, 1897.



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UNITED STATES PATENT OFFICE.

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CALLING APPLIANCE FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 587,080, dated July 27, 1897.

Application filed November 12, 1895. Serial No. 568,673. (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 Calling Appliances for Telephone-Switchboards, (Case No. 33,) 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 concerns the apparatus provided in switchboards of telephone-exchanges for transmitting selective signals in "party" telephone-lines. It is an arrangement of circuits and circuit-controlling switch-keys for connecting the source or sources of signaling-current with any one of several plug-circuits, by which an economy of mechanism and increased facility of manipulation are attained.

In many systems of party-lines provided with signaling instruments at the different stations adapted for selective operation keys are furnished the operator attending the lines equal in number to the stations on a single line, each key being constructed to determine the operation of a particular signaling instrument only. It has been customary to connect a group of such keys in each of the several plug-circuits—usually fifteen—allotted to one operator, and another key has been placed in each of the plug-circuits controlling the connection of the operator's telephone with the circuit.

In the present invention I have aimed to utilize a single group of specialized signal-transmitting keys for a number of plug-circuits, controlling the connection of these keys and also that of the telephone with any plug-circuit through the agency of a special listening-key in the plug-circuit. This listening-key is constructed when in one position to connect the operator's telephone with one plug of a pair and to simultaneously connect the signal-transmitting keys with the other plug of the pair, and in another position to interrupt both these circuit connections, completing the plug-circuit directly between the two plugs. The operator may leave these listening-keys of her different plug-circuits in position when the plugs are not in use to complete connection between the telephone and one plug of each of the pairs and between the signal-transmitting keys and the other plug of each pair. Then upon receiving a call from any line she will at once bring her telephone into connection with the calling-line by means of the former plug of any pair, and, having heard the order for the connection required, will connect the signaling-keys with the line leading to the required station by means of the other plug of the same pair without the manipulation of any keys. She will then operate the proper signaling-key to call the required station, after which she will move the listening-key of the plug-circuit used into position to complete it and to sever its connection with the telephone and with the signaling-keys. The use of this special listening-key, by means of which the disconnection of the signaling-keys is effected simultaneously with that of the telephone, is not essential in my invention, although it contributes to the utility of the device.

The invention is shown in the accompanying drawing associated with a well-known system for selective signaling, comprising four signal-bells, which are connected in pairs with the two line conductors of a metallic circuit, the bells connected with one line conductor being responsive to currents of opposite polarity. Four signaling-keys then constitute the group, each adapted to transmit current of proper character over a particular circuit to operate one of the bells. These keys are shown connected with two plug-circuits, this number being sufficient to illustrate the invention. A key for connecting the usual generator of signaling-current to operate the ordinary polarized bells is added to the group, and also a listening-key for occasional use in bringing the telephone into circuit with the calling-plug.

In the figure five substations A, B, C, D, and E are represented, connected by two line-circuits with the usual apparatus in a switchboard. Station A is connected with the individual line 1 2. The line conductors appear in the contact-pieces of a spring-jack *f* in the switchboard, and include a visible signal or annunciator *g* and a battery *h*, the spring-jack being constructed to interrupt

the connection of the line with this apparatus during its use. The apparatus at the substation comprises the usual transmitting-telephone i and receiving-telephone i', a polarized bell i^2 of high resistance, and a telephone-switch i^3, which completes the line-circuit through the telephones when they are in position for use.

The stations B, C, D, and E are located on the party-line 3 4. This line-circuit is represented in the switchboard by a spring-jack f' and by an annunciator g', these line conductors being also connected with the battery h. These latter stations also are furnished with telephones i and i', bells i^2, and switches i^3. Each bell has a light spring acting upon its armature, tending to throw it to one of its extreme positions, so that it may be operated by a pulsating current of a particular direction only. The bells at stations B and C are connected in ground branches from the line conductor 4 and have their springs differently disposed, so that they require currents of opposite directions for their operation, negative and positive, respectively. The bells at stations D and E are in ground branches from line-wire 3, and are also adapted to be rung, the former by negatively and the latter by positively directed currents.

Two pairs of plugs k k' and k^2 k^3 are shown. The like contact-pieces of the members of each pair are connected by the conductors 5 and 6 of a plug-circuit. Each of the conductors of a plug-circuit includes, serially, two helices of an induction-coil l, and is connected at a point intermediate of the helices by a wire with a pole of battery h, the wires leading to the conductors 5 and 6 being designated 7 and 8, respectively. Each "sleeve-conductor" of a plug-circuit contains two visible signals m and m', one at each side of the induction-coil, so that one may be in circuit between the battery and each of two telephone-lines united through the agency of the plug-circuit.

All the apparatus so far described is well known in the art of telephony.

In this invention a listening-key n is included in each plug-circuit. This key has two pairs of switch-springs n' n^2 and n^3 n^4, between which oscillates a double-faced wedge n^5, carried by the handle of the key. Each of the members of the former pair has a normal and an alternate contact-anvil, these being lettered in the drawing n^6 n^7 and n^8 n^9, respectively. Each member of the latter pair of switch-springs has only a normal resting-contact, the two being indicated by letters n^{10} and n^{11}. When the lever is moved to thrust the wedge n^5 between the springs n' and n^2, these are raised from their normal anvils n^6 and n^7 and are forced against contacts n^8 and n^9. At the same time springs n^3 and n^4 are permitted to rest on their anvils n^{10} and n^{11}. When wedge n^5 is moved in the opposite direction, the springs n^3 and n^4 are raised from anvils n^{10} and n^{11} and springs n' n^2 are separated from contact-points n^8 n^9 and come to rest on anvils n^6 n^7.

The portions of conductors 5 and 6 leading to the plug k' terminate in contact-anvils n^6 and n^7 of this key and are connected with the switch-springs n^3 and n^4. Those portions of the same conductors which lead to plug k' terminate in switch-springs n' and n^2 of the key. The resting contact-anvils n^{10} and n^{11} constitute open terminals of two wires 9 and 10, leading to the operator's telephone o. Contact-points n^8 and n^9 in all the keys form terminals of conductors 11 and 12, leading to the group of signaling-keys. These keys are of ordinary type, each with a pair of switch-springs oscillating between normal and alternate contacts. They are designated in the drawings a, b, c, d, and e in accordance with the designations of the stations whose bells they are intended to ring. A sixth key p is added to the group for a purpose which will be explained later. One switch-spring and its resting-contact of each of these keys are included in each of the wires 11 and 12. The alternate contacts of key a are the terminals of a signaling-generator q of alternating current. That alternate contact of key b which is brought into connection with wire 11 and that of key d which is brought into connection with wire 12 are led to the negative terminal of a grounded generator r. This appliance is constructed to deliver pulsating currents of different directions to its brushes and is a well-known device for operating bells of the type here employed. The similar contact-points of keys c and e are connected with the positive terminal of the same generator r. The other contact of each of the keys is grounded. The alternate contacts of listening-key p connect with the wires 9 and 10, leading to the operator's telephone.

The keys n of the plug-circuits which are not in use should be left with the wedges n^5 thrust between the springs n' n^2. The plugs k or k^2, which are denominated "answering-plugs," being designed for use in answering calls, are then all connected with the operator's telephone o, and their connection with the other members k' or k^3 is severed at points n^6 n^7. The calling-plugs k' k^3 are all connected with the group of signaling-keys. The operation of key a of this group will obviously permit an alternating current from generator q to flow out to all plugs k'. The key b when depressed will send a negative pulsating current to the tips of the plugs. Key c will send a positive current to the same parts. Key d will send a negative and key e a positive current to the sleeves of the plugs. The key p may be used to connect the telephone o with any or all the plugs k'.

The removal of the telephone from its telephone-switch for use at a substation causes the display of the corresponding signal in the switchboard. In response to this signal the operator inserts an answering-plug k into the spring-jack of the signaling-line, whereby her

telephone becomes connected with the line. Supposing the calling subscriber is at station A and that the required correspondent is at station D. The operator inserts calling-plug k' of the same pair into spring-jack f' and depresses the key d. This operation causes the bell at station D to ring, but leaves the other bells undisturbed.

If it should be necessary after transmitting the call to speak with the responding subscriber, the operator may press key p, bringing her telephone into circuit with the line. Having signaled the correspondent, the operator places key n in position to complete the plug-circuit between the members k and k' of the pair used, whereby the telephone and the group of signaling-keys are at the same time cut off from the plug-circuit, leaving a complete circuit between the stations A and D. The supervisory signals m and m' serve to inform the attendant of the removal of the station-telephones from their switches and their replacement thereon at the termination of conversation.

The application of this invention thus permits the use of a single group of special calling-keys for a considerable number of pairs of plugs without necessitating additional manipulation of keys, and it eliminates the numerous switch-contacts of the special keys from the plug-circuit during its use in uniting lines.

I claim as my invention—

1. The combination with telephone-lines, each provided with signaling appliances adapted for selective operation, several pairs of plugs for uniting lines, their associated plug-circuits, the operator's telephone, of conductors and a group of keys each determining the transmission in the said conductors of a current adapted to operate a particular signal, and a key in each plug-circuit adapted to take either of two positions, said key being adapted when in one position to break the plug-circuit and to connect the telephone with one plug of the pair and the said conductors with the other plug of the pair, and in its other position to complete the plug-circuit, substantially as described.

2. The combination with telephone-lines and a return-circuit therefor, each having oppositely-polarized signal-bells in branches between each line conductor and the return-circuit, of several pairs of connecting-plugs for uniting different telephone-lines, a key in each plug-circuit adapted to assume two positions, in one of which positions it severs the plug-circuit and connects the operator's telephone with one of the plugs and a pair of signaling-conductors with the other plug, and a group of keys connected with said signaling-conductors, one adapted to send current of each polarity on each line conductor to operate a corresponding bell, as described.

In witness whereof I hereunto subscribe my name this 1st day of October, A. D. 1895.

FRANK R. McBERTY.

Witnesses:

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