

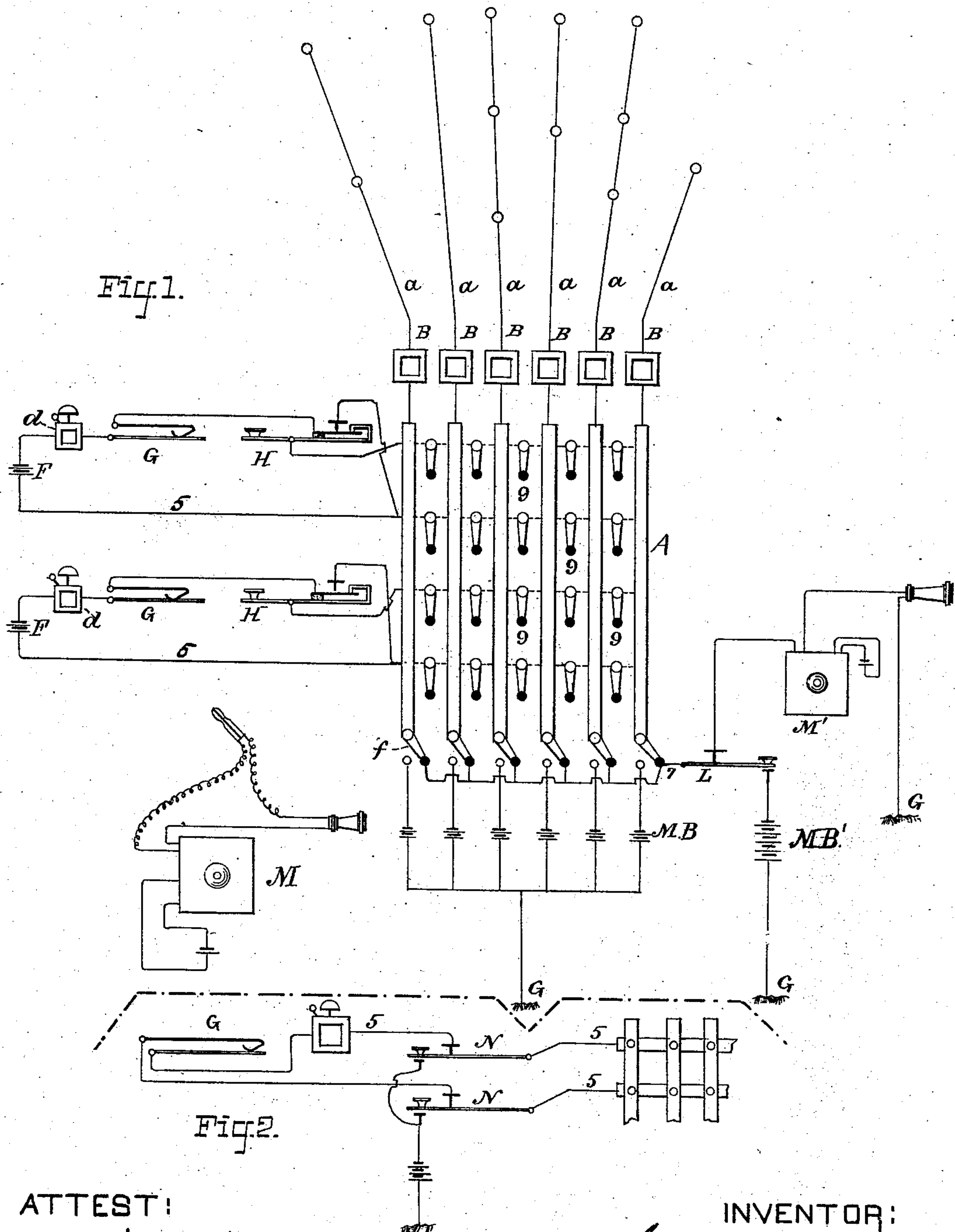
(No Model.)

G. W. COY.

TELEPHONE EXCHANGE SWITCH APPARATUS.

No. 260,667.

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ATTEST:

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UNITED STATES PATENT OFFICE.

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TO JAMES G. SMITH, OF HACKENSACK, NEW JERSEY, AND CHARLES E.
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TELEPHONE-EXCHANGE SWITCH APPARATUS.

SPECIFICATION forming part of Letters Patent No. 260,667, dated July 4, 1882.

Application filed February 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEO. W. COY, of Milford, in the county of New Haven and State of Connecticut, have invented certain new and
5 useful Improvements in Telephone-Exchange Switch Apparatus, of which the following is a specification.

My invention consists of certain novel and simplified combinations of apparatus for signaling to either or both of two subscribers after their lines have been connected, and for
10 allowing the central-office operator to ascertain, either by interposing a telephone without breaking the connected lines or by the aid of
15 a disconnecting-annunciator, whether or not conversation has ceased.

The nature of my invention will be readily understood from the accompanying drawings and description, and will be particularly defined in the claims hereto annexed.

Figure 1 is a diagram of a central-office switch-board and apparatus embodying my invention. Fig. 2 is a modification showing an arrangement whereby either of two connected
25 subscribers may be signaled without signaling the other.

Referring to Fig. 1, A represents a portion of a central-office switch-board, of any desired construction, adapted to connect any two of
30 the line strips or plates to which the several subscribers' wires are connected.

The subscribers' lines are indicated at *a a a*, &c., while *B B B*, &c., are annunciators for indicating to the central-office operator the line
35 from which a call comes.

The devices whereby the line-strips are connected for placing subscribers in communication are here shown as horizontal rows of pivoted switches, each pair of horizontal rows
40 forming the terminals of a local loop, 5, so that when a switch-lever of a row connected to one end of the loop is placed upon one line-strip and a lever of a row connected to the other end upon another line-strip the two line-strips
45 will be electrically connected through the loop.

It is obvious that other forms of switch de-

vices might be used for the work—as, for instance, the well-known plug and bar switch.

In each loop 5 is included as an annunciator or signal-bell, *d*, a battery, *F*, a spring-jack, *G*,
50 and a signaling-key, *H*.

The spring-jack *G* allows a telephone apparatus, *M*, of any well-known construction, to be inserted in the loop when two subscribers are connected there, though without breaking
55 the circuit, so that the central-office operator may communicate with the subscribers or may listen to ascertain when conversation has ceased, while the calling-key *H* allows the central-office operator to ring a subscriber's bell
60 after the lines are connected by short-circuiting battery *F*, or in any other suitable manner controlling the flow of the current from the battery to the connected lines. Each main-line circuit is normally to ground through one
65 of a series of switches, *f*, which should be normally connected to the studs leading to the main-line batteries *M B*, or to a single battery for all the lines and to earth. These switches
70 *f* may be turned to connect a main line to a wire, 7, leading to a circuit-shifting apparatus, *L*, which in its normal position completes the circuit of 7 to earth through its upper stop and the telephone apparatus *M'*, and which
75 may be shifted to break the latter circuit and close a circuit leading to a main battery, *M B'*, or other suitable generator or apparatus for sending currents to line to operate the subscribers' bells.

Battery *M B'* may, if desired, be used in the
80 usual operations of signaling to a subscriber called for, although I design ordinarily employing for this purpose the calling-keys placed in connection with loops 5, and reserving the generator *M B'* for use only when it is desired
85 to hold conversation between the central office and a subscriber's station, and it is necessary for the central office to call that station.

The operation is as follows: Normally each line is connected, as usual, to earth through
90 the main-line annunciator *B* and the main-line battery *M B*. Upon receiving a call from

a line the central-office operator connects that line to the telephone apparatus M' by operating a switch of the construction shown, or of any other construction suitable for the purpose, and, upon learning the name or number of the subscriber or line wanted, immediately connects the two lines through a loop, 5, and the apparatus contained therein in the manner before described, and disconnects the line called from its earth-connection by means of its switch *f*. He then operates the calling key or apparatus H any number of times, thus causing the bell of the subscriber called for to ring by the alternate flow and withdrawal of the current from the lines, and leaves the two connected subscribers to begin conversation. The bell of the subscriber from whom the call is first received is not affected, having been placed out of connection with the line in the ordinary way by the act of taking up the telephone. As will be observed, the act of withdrawing the battery F from line by key H does not affect the annunciator *d*, since the battery F continues to flow through the annunciator, and the key H, being a continuity-preserving key, as indicated, does not interrupt the flow of the battery. When the subscribers have finished their conversation they cause an interruption of the circuit, either automatically through the action of the switch apparatus when operated to restore the subscribers' instruments to their normal condition, or through any other suitable devices in a well-known manner, thus interrupting the flow of battery-current from F and operating annunciator *d*, which is suitably constructed for this purpose.

At any time during conversation between subscribers, or immediately after connecting their lines and before conversation begins, the central-office operator may, by means of spring-jack G, insert the telephone apparatus M without interrupting the circuit, for the purpose of listening or to communicate with the subscribers.

Fig. 2 represents a modified arrangement of calling-keys in the loop and of the calling-battery. In this arrangement the calling-battery is connected to ground and to the lower contacts of two calling-keys, N N, placed in the loop 5, and so connected that their upper contacts form a portion of the loop-circuit. If, when two lines are connected, one of said keys be operated for the purpose of connecting the calling-battery to the line connected to its side of the loop, the line connected to the other side of the loop, and the key there placed, is disconnected, and the battery flows only to the line desired. In this arrangement the disconnecting-annunciator must be operated by a current transmitted from the subscriber's station. By this arrangement any subscriber may be called whether his line be connected to another through a loop, 5, or not, it being only necessary to connect the line to one end of the

loop and operate the nearest key. The switch L and battery M B' could, under this plan, be dispensed with. Instead of the calling-key H, any other suitable device placed in the loop through which the lines are to be connected might be employed, whether acting or not to interrupt the flow of the battery through the annunciator.

The annunciator B might be placed between the disconnecting-switches *f* and the ground.

My invention is not limited to any details of construction in the various switches, keys, &c., these being well known in the art, and it being perfectly feasible to substitute many other forms for those here shown.

I do not claim the combination, with a telephone switch-board, of a loop containing a spring-jack, telephone apparatus connected to the plug of the spring-jack, and means for connecting the lines of subscribers to the ends of said loop.

What I claim as my invention is—

1. The combination, substantially as described, with a telephone switch-board, of a loop containing a signaling-key, and means for connecting any two subscribers' lines through said loop and signaling-key.

2. The combination, substantially as described, with a telephone switch-board, of a loop containing a signaling-key, means for connecting any two subscribers' lines through said loop and signaling-key, a battery or other suitable generator of electricity, and circuit-connections, as described, whereby the operation of the key alternately withdraws and introduces a signaling-current to a main line.

3. The combination, substantially as described, with a telephone central-office switch-board, of a loop containing an annunciator, battery, and signaling-key, and means for introducing said loop between any two telephone-lines.

4. The combination, substantially as described, with a telephone switch-board, of a loop containing a battery and annunciator, means for connecting the subscribers' lines for oral communication through said loop and battery, and a short-circuiting signaling-key for short-circuiting the battery in the loop through the annunciator.

5. The combination, substantially as described, with two line-connecting strips or wires in a telephone switch-board, of a loop-wire the ends of which are connected to said line-strips, and a battery, annunciator, and signaling-key included in said loop.

6. The combination, substantially as described, with two line-connecting strips or wires in a telephone switch-board, of a loop-wire the ends of which are connected to said line-strips, and a spring-jack and annunciator included in said loop.

7. The combination, substantially as described, with two line-connecting strips or wires in a telephone switch-board, of a loop

connected to said line-strips and devices for signaling to a subscriber's station, said devices being placed in the loop so as to be in circuit between the lines connected by said
5 loop.

8. The combination, substantially as described, with two line-connecting strips or wires in a telephone switch-board, of a loop

connected to the line-connecting strips, a battery included in said loop, and a key, also connected in the loop, and operating to withdraw the battery from the connected lines.

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Witnesses:

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