(No Model.) 2 Sheets—Sheet 1.

A. G. HOLCOMBE.

ELECTRICAL COMMUNICATING SYSTEM.

No. 371,940. Patented Oct. 25, 1887.

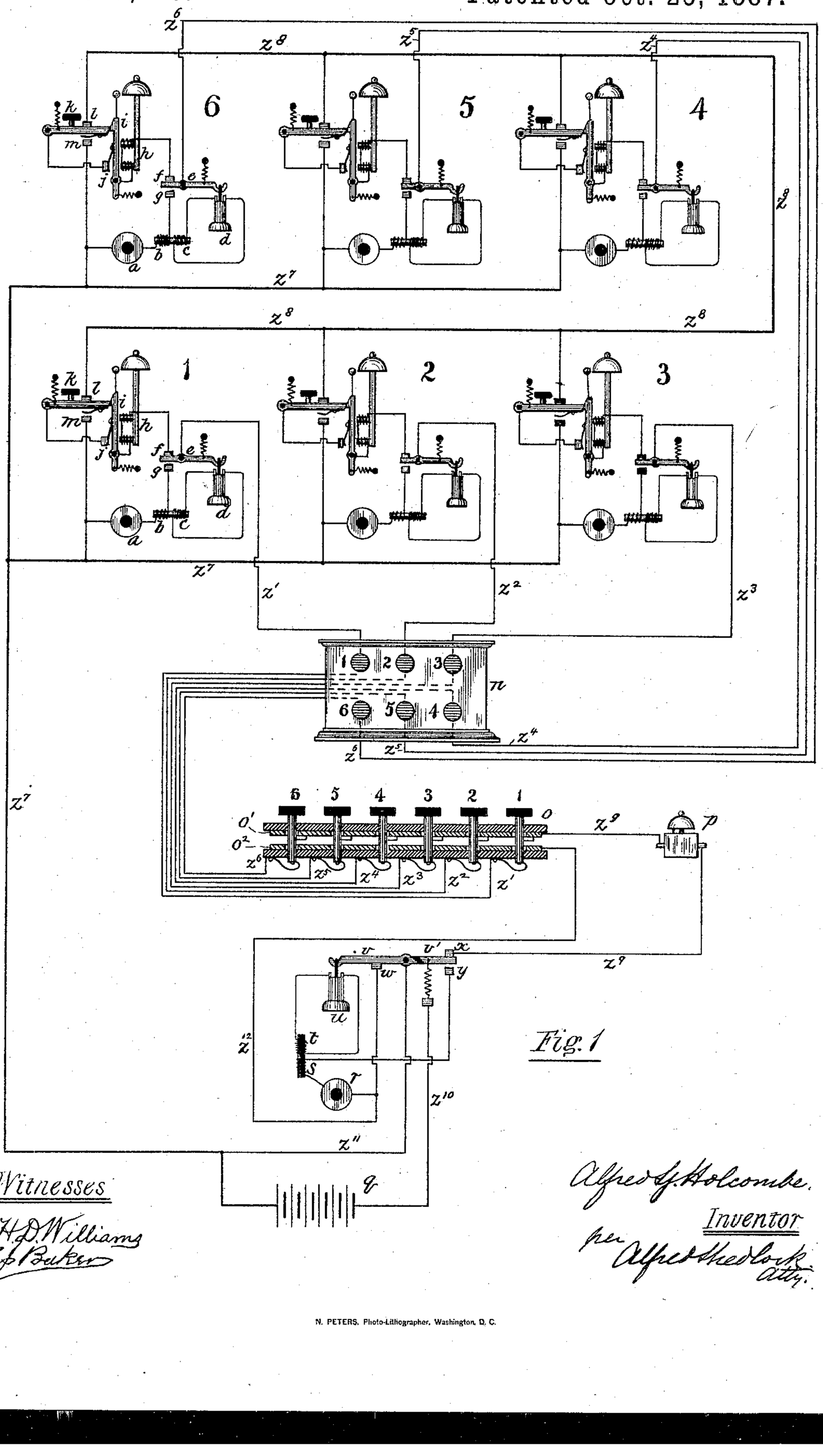

Fig. 1

Witnesses

H. D. Williams

H. J. Baker

Alfred G. Holcombe.

Inventor

per Alfred Stedlock

Atty.

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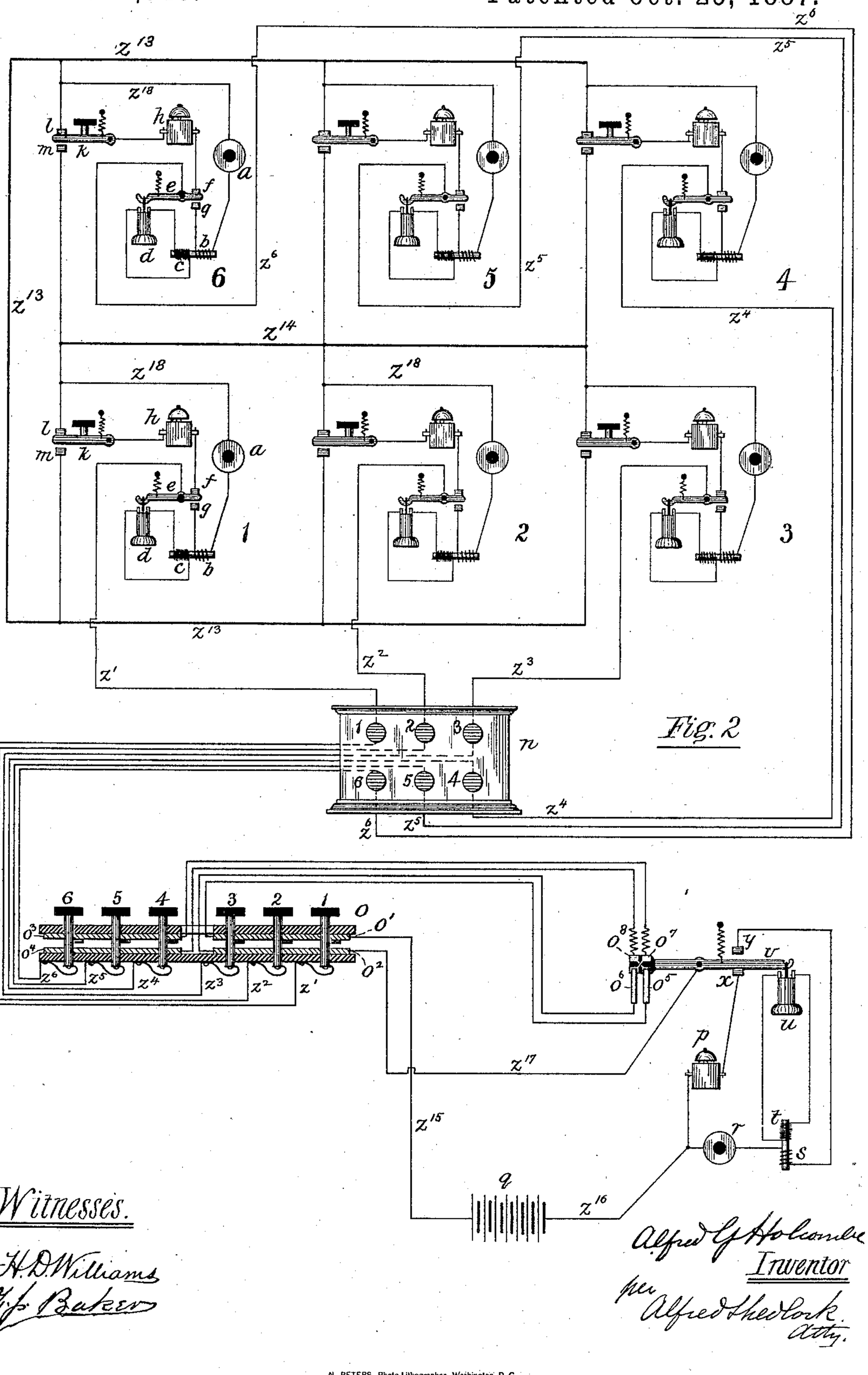

Fig. 2

Witnesses.

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UNITED STATES PATENT OFFICE.

ALFRED G. HOLCOMBE, OF NEW YORK, N. Y.

ELECTRICAL COMMUNICATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 371,940, dated October 25, 1887.

Application filed July 20, 1886. Serial No. 208,526. (No model.)

To all whom it may concern:

Be it known that I, ALFRED G. HOLCOMBE, a citizen of the United States, residing at New York, county and State of New York, have invented certain new and useful Improvements in Electrical Communicating Systems, of which the following is a specification.

In my present improvement in the art of communicating between a central station or office and a number of sub-stations or rooms connected thereto by means of individual lines, the return-circuit for any one of the rooms, when in communication with the central station or office, is composed of a part or the whole of the other individual lines connected up in multiple arc. The current from the battery at the office, while sufficient to actuate one set of instruments, is, because of being diffused or caused to flow in multiple arc through a number of instruments and their individual lines, insufficient to actuate any of the instruments included in the collected lines forming the return-circuit. This admits of three distinct operations or workings between the rooms and office by means of simple, inexpensive instruments—viz., a call from any of the rooms to the office, a call from the office to any of the rooms, and communication between any of the rooms and the office. By adopting this idea of employing a number of individual lines for the return-circuit of one line I am enabled to produce a perfect system of telephonic communication between a central office and a number of rooms, particularly adapted for hotel use.

In carrying out this invention the ordinary wire system, comprising a main line from the office to all of the rooms and individual lines from the rooms to the office, may be used, a collective line being added thereto, which connects all the rooms together; or the ordinary main line may be omitted, the system then comprising individual lines from the rooms to the office and two or more collective lines for connecting or assembling the rooms into two or more groups.

In using the ordinary main line with my improved system all the circuits are normally open and the lines are combined in the different operations as follows: Upon calling up the office from any of the rooms the current flows through the main line and the individual line of the room; upon calling up any of the rooms from the office the current flows through the individual line of the room called and all the other individual lines, the current being diffused or divided between them, and in communicating with any of the rooms the current flows through the main line and the individual line of the room.

In the system where individual lines only are used to join the rooms to the central office the rooms are preferably divided into two groups, with two collective lines joining all the rooms together, one of these lines having normally-open connections with the first group of rooms and closed connections with the second group, the other collective line having normally-closed connections with the first group and open connections with the second group. Upon calling up the office from any of the rooms the current flows through the individual line of the room and is diffused in multiple arc through all the other lines of the other group of rooms. Upon calling up a room from the office the current flows through the individual line of the room called and is diffused in multiple arc through all the other lines of the same group; and when communication is had with any of the rooms the current flows through the individual line of the room and is diffused in multiple arc through all the other lines of the same group.

The arrangement of the lines and instruments included therein will be fully understood by reference had to the accompanying drawings, in which—

Figure 1, Sheet 1, represents my improved system embracing a main line, individual lines, and a collective line for joining all the sub-stations or rooms together; and Fig. 2, Sheet 2, represents the system with individual lines only connecting the rooms to the central station and two collective lines connecting the rooms together.

In the exemplification of my improved method of communication by utilizing the individual lines of the sub-stations or rooms not in operation, as the return-circuit from a sub-station or room when communicating with the

central station or office, as shown at Fig. 1, the apparatus in each of the sub-stations or rooms (marked 1, 2, 3, &c.) consists of a telephonic outfit comprising a transmitter, *a*, primary coil *b* of an inductorium, secondary coil *c*, telephonic receiver *d*, switch-lever *e*, and contact-stops *f g*, a call-bell, *h*, the armature *i* of which is provided with a spring arranged to make and break circuit with the contact *j*, and a push-button or lever, *k*, arranged to play between two contact-stops, *l* and *m*, said lever, when depressed, being held in contact with the stop *m* by means of a hook-catch on the armature *i* of the call-bell. The object of passing the current through the armature *i* and its spring to the contact *j* is to impart a vibrating action to the hammer. If it be desirable to use a single-stroke bell, the magnet of the bell may be connected directly to the lever *k*.

At the central station or office is located an annunciator, *n*, of ordinary construction, a switch-board, *o*, having as many push-buttons as there are sub-stations or rooms in the system, and correspondingly numbered, a call-bell, *p*, a battery, *q*, and a telephonic outfit, comprising a telephonic transmitter, *r*, primary coil *s* of an inductorium, secondary coil *t*, receiver *u*, switch-lever divided into two insulated parts, *v* and *v'*, and contact-stops *w*, *x*, and *y*. The principal line-wires used in this system are the individual lines z' z^2 z^3, &c., connecting the levers *e* of the telephonic outfits in the rooms to their respective spring push-buttons of the switch-board *o*, each line including a correspondingly-numbered drop device in the annunciator *n*. The main line z^7 extends from one end of the battery *q* and unites with the contact-stops *m* in the sub-stations or rooms. The collective line z^8 unites all the rooms together through the contact-stops *l*.

In Fig. 1 all the devices are shown in normal condition, no current now flowing from the battery *q*.

The occupant of any of the rooms, to call up the office, depresses the lever *k*, so as to cause it to break contact with the stop *l* and make contact with the stop *m*. The current now flows from the battery *q*, through the main line z^7, to the stop *m*, through the lever *k*, stop *j*, armature *i*, the electro-magnet of call-bell *h*, stop *f*, lever *e*, and the individual line of the room, to the annunciator, causing the indicating-number of the room to be exposed, and from thence to the corresponding spring push-button of the switch-board *o*, and from the upper plate, *o'*, of the switch-board, against which all the push-buttons normally bear, the current passes through the line z^9, actuating the call-bell *p*, included therein, and back to the battery *q*, through stop *x*, part *v'* of the telephone-lever, and line z^{10}.

The office attendant, to call up a room or to notify the occupant who has called the office that his message can be received, depresses the corresponding push-button of the switch-board *o*, thereby breaking contact with the plate *o'* and making contact with the lower plate, o^2. The current from the battery *q* now flows through the line z^{11}, lever *v*, to stop *w*, line z^{12}, to lower plate, o^2, of the switch-board, and from thence by the individual line of the room whose push-button is depressed to the lever *e*, stop *f*, call-bell *h*, lever *k*, and by the stop *l* to the collective line z^8; and from this collective line z^8 the current is diffused through all the other individual lines, they being normally in multiple circuit between the collective line and the upper plate, *o'*, of the switch-board *o*, each of such normal individual circuits comprising the stop *l*, lever *k*, armature *i*, call-bell *h*, stop *f*, lever *e*, and the number drop magnet of the annunciator *n*. From the plate *o'* of the switch-board the current flows, as before, back to the battery through the line z^9, call-bell *p*, stop *x*, part of lever *v'*, and line z^{10}. The whole of the current thus passes through the one selected individual line, and thereby actuates the call-bell therein, but is divided on its return to the battery between all the other individual lines, the amount of current flowing through each of them being insufficient to actuate the apparatus therein. It will thus be seen that when a room is called, or its call answered from the central station or office, the main line z^7 is not used. Communication may now be had between the called room and the office by removing the telephonic receivers from the lever *v v'* at the office and the lever *e* at the room, the attendant at the office retaining the push-button in contact with the lower plate, o^2, of the switch-board. This causes the current from the battery to flow through the main line z^7, microphonic transmitter *a*, primary coil *b* of the inductorium, stop *g*, lever *e*, the individual line of the room, to the lower plate, o^2, of the switch-board, and by the wire z^{12}, through the telephonic transmitter *r*, primary coil *s* of office inductorium, to the contact-stop *y*, the part *v'* of telephonic lever, and by the wire z^{10} back to the battery *q*. The two microphonic transmitters *r* and *a* are thus in circuit with the battery *q*, and the variations of the current therein, caused by the action of the transmitter, induce in the secondary coils *t* and *c*, and their connected receivers *u* and *d*, impulses corresponding to the sound-waves impinging on the transmitters. Now, while communication is being had between the office and one of the rooms, the push-buttons or levers *k* in one or more of the other rooms may be depressed without interfering with the instruments in action or causing the call-bells of the rooms and office to work, because the circuits of all the rooms whose push-buttons of the switch-board *o* are in contact with the plate *o'* are broken at the stop *x*, the call-bell *p* also being cut out of circuit; but such depressed levers *k* are held down by the armatures *i* of the call-bells in the rooms until the calling-circuit is again closed by the attendant at the office and the occupant of the room in commu-

nication replacing the receiving-instruments on the hooks of their respective supporting-levers. The annunciator *n* then indicates the rooms requiring service, which rooms may then be successively served by the office attendant first depressing the push-buttons of the switch-board and then removing the telephonic receiver, as before. The first action of the current caused to flow through any of the set instruments is to actuate the call-bell and release the lever *k*, placing the communicating circuit into active condition and notifying the occupant of the room thus called that his message can now be received at the office.

In the application of my invention to a system employing individual lines only to connect the rooms to the office, as shown at Fig. 2, the instruments in the rooms are similar to and lettered in correspondence with those shown in Fig. 1, with the exception that the push-button or lever *k* is not held down by the armature of the call-bell *h*. The rooms in this case are divided into two groups, connected together by the two collective lines z^{13} and z^{14}, the line z^{13} joining the stops *m* of the first group of rooms, 1, 2, and 3, which are normally open, and the stops *l* of the second group of rooms, 4, 5, and 6, which are normally closed, and the line z^{14} joining the normally-open stops *m* of the second group of rooms, 4, 5, and 6, and the normally-closed stops *l* of the first group of rooms, 1, 2, and 3.

The upper and lower plates of the switch-board *o* at the office are divided into two parts, o' o^3 and o^2 o^4, the parts o' and o^2 being provided with lines terminating in brushes o^5 o^6, and the parts o^3 o^4 with lines terminating in a cross commutator switch, o^7 o^8, carried on the end of the telephone-lever *v*, on which the brushes o^5 o^6 bear. With the telephone-receiver *u* hanging on the lever *v*, as shown, the plate o' is connected to the plate o^4, and the plate o^2 to the plate o^3, and with the lever *v* released the commutator o^7 o^8 connects the two sections o' o^3 of the upper plate together and the two sections o^3 o^4 of the lower plate together. One pole of the battery *q* is connected by the line z^{15} to the section o' of the upper plate, the other pole by the line z^{16}, through the call-bell *p*, to the stop *x*, and, through the microphonic transmitter *r* and primary coil *s*, to the stop *y*. The stop *x* is normally in contact with the lever *v*, which is connected to the section o^2 of the lower plate of the switch-board *o* by the line z^{17}.

All of the circuits are shown open with the instruments quiescent. Now, assuming that room No. 1 wishes to communicate with the office, the lever *k* is depressed, making contact with the stop *m*. The current now flows from the battery to the plate o' of the switch-board, through the individual line z' and annunciator *n*, to lever *e*, stop *f*, call-bell *h*, lever *k*, and stop *m*, to the collective line z^{13}, from whence it is diffused through or divided between all the individual lines of the other group of rooms, 4, 5, and 6, passing by the stops *l*, levers *k*, call-bells *h*, stops *f*, levers *e*, lines z^4 z^5 z^6, to plate o^3 of the switch-board, through commutator-plate o^7 and brush o^6 to plate o^2, then by line z^{17} to lever *v*, stop *x*, call-bell *p*, and line z^{16}, back to battery *q*. Thus the call-bells of room 1 and of the office are caused to ring, and the indicating device of the annunciator dropped, as the whole of the battery-current flows through them; but none of the instruments in the collected return individual lines of the group of rooms 4, 5, and 6 is affected, as the proportional amount of current flowing through each of them is insufficient for this purpose. The attendant at the office now sends a return signal to the room, to give notice that he is ready to communicate, by depressing the corresponding push-button of the switch-board *o*. The current now flows through all the other push-buttons of the group in contact with the plate o', and their individual lines z^2 z^3 in multiple arc, to the stops *l* in the rooms 2 3, and by the collective line z^{14} to the stop *l* of room 1, through the lever *k*, call-bell *h*, stop *f*, lever *e*, individual line z', to the plate o^2 and back to the battery, as before, through the office call-bell *p*. When the telephonic receivers *u* and *d* are removed from the levers *v* and *e* for communication, the push-button of the switch-board *o* being held down, the circuit then includes the battery *q* and microphonic transmitters *r* and *a*, and consists of the line z^{15}, plate o', all the individual lines in contact therewith, the instruments in the rooms, as before, the collective line z^{14}, the short connecting-line z^{18}, transmitter *a*, primary coil *b*, stop *g*, lever *e*, the individual line of the room, plate o^2, line z^{17}, lever *v*, stop *y*, primary coil *s*, transmitter *r*, and line z^{16}, to battery *q*.

It will be observed that during the operation of the communicating instrument both of the call-bells *p* and *h* are cut out of the circuit; that no interference can be had by the depression of the push-buttons of any of the other rooms, and that, because the commutators o^7 o^8 connect the divided plates of the switch-board *o* into single upper and lower plates, the current is caused to flow through the circuit, as above indicated, and communication may be had with any of the rooms in the two groups without interference from the other rooms.

While my above improvements in electrical circuits provide perfect means for communicating between a central station or office and a number of sub-stations or rooms by telephonic instruments, I do not confine myself to such application thereof, as it is evident that automatic electrical transmitters and receivers may be substituted for the telephonic instruments.

What I claim, and desire to secure by Letters Patent, is—

1. In an electrical signaling or communicating system, in combination, individual lines connecting the sub-stations or rooms to the central station or office, a main line con-

necting the central station to all of the sub-stations, a switch-board at the central station having two connection-plates and push-buttons, to which the individual lines are joined, a battery connected in circuit between the two plates of the switch-board, and a switch in the battery-circuit, by the manipulation of which the battery-connections with the two plates of the switch-board are reversed, substantially as described.

2. In an electrical signaling or communicating system, in combination, individual lines connecting the sub-stations or rooms with the central station or office, a main line connecting the central station to all of the sub-stations, a collective line common to all of the sub-stations, a switch at each sub station normally connecting its individual line with the collective line, by the manipulation of which the individual line is connected to the main line, a switch-board at the central station having two connection-plates and push-buttons, to which the individual lines are joined, a battery connected in circuit between the two plates of the switch-board, and a switch in the battery-circuit, by the manipulation of which the battery-connections with the two plates of the switch board are reversed, substantially as described.

3. In an electrical signaling or communicating system, in combination, individual lines connecting a central office to a number of sub-stations, a call-bell included in each of the individual lines at the sub-stations, a collective line normally joining together all the individual lines at the sub-stations, and a switch-board at the central office provided with two connection-plates, with one of which all of the individual lines are normally in contact, and a battery connected in circuit between the two connection-plates of the switch-board, substantially as set forth.

4. In an electrical signaling or communicating system, in combination, individual lines connecting a central office to a number of sub-stations, a call-bell included in each of the individual lines at the sub stations, a call-bell and battery at the central office, a main line from the battery to all the sub stations having normally-open contact-stops, and at each of the sub-stations a push-button or lever for closing the individual circuit with the main line, a retention device for holding the push-button or lever closed after depression, and an electro-magnet for actuating the retention device to cause it to release the push-button or lever when a current is sent through said closed circuit, substantially as set forth.

5. In an electrical signaling or communicating system, in combination, individual lines connecting a central office to a number of sub-stations, a call-bell included in each of the individual lines at the sub-stations, a call-bell and battery at the central office, a main line from the battery to all of the sub-stations having normally-open contact-stops, a push-button or lever for closing the individual circuits with the main line, a retention device for holding the push-button or lever closed after depression at each of the sub-stations, a collective line normally joining together all of the individual lines at the sub-stations, a switch-board at the central office provided with two connection-plates, with one of which all of the individual lines are normally in contact, and an annunciator through which the individual lines pass at the central office, substantially as set forth.

6. In an electrical signaling or communicating system, in combination, individual lines connecting the sub-stations to the central office, telephonic outfits at the sub-stations, the transmitters and primary coils of the inductoriums of which are included in the individual lines, a battery at the central office, a main line joining the battery to the transmitters of the sub-stations, a switch-board for closing any of the individual lines, and a telephonic outfit at the central office, the transmitter and primary coil of which are included in the circuit between the battery and the switch-board, substantially as set forth.

7. In an electrical communicating system, in combination, a main line connecting the central station to the sub-stations, individual lines connecting each of the sub-stations and the central office, a collective line normally joining together all the individual lines at the sub-stations, a battery in the main line, an electrical transmitting-instrument at each of the sub-stations located between its individual and the main line on normally-open circuit, and a switch-lever at each of the sub-stations for closing the transmitter-circuit, breaking the connection of the individual line with the collective line, an electrical receiving-instrument at the central office, and a switch-lever for including said instrument in the main line with the battery and the transmitting-instrument of the sub-station whose circuit is closed, substantially as set forth.

8. In an electrical communicating system, in combination, a main line connecting the central station to the sub-stations, individual lines from the sub-stations to the central office, an electrical transmitting-instrument at each of the sub-stations located between its individual line and the main line on normally-open circuit, a switch-lever at each of the sub-stations for closing the transmitter-circuit, a battery at the central office in the main line, a switch-board and a receiving-instrument at the central office on normally-open circuit, and a switch-lever for completing the circuit of the main line and one of the individual lines through the battery and receiving-instrument, and breaking the circuit of all of the other individual lines, substantially as set forth.

9. In combination, a call-bell, its actuating electro-magnet, a push-button or lever, which when depressed closes the call-bell circuit, and

a retention device operated by the armature of the electro-magnet, which holds the push-button or lever closed after depression, and is actuated to release the push-button or lever by a current sent over line through the call-bell, substantially as described.

In witness whereof I have hereunto set my hand at New York, county and State of New York, this 19th day of July, 1886.

ALFRED G. HOLCOMBE.

In presence of—
ALFRED SHEDLOCK,
F. W. CRONKHITE.