

No. 773,007.

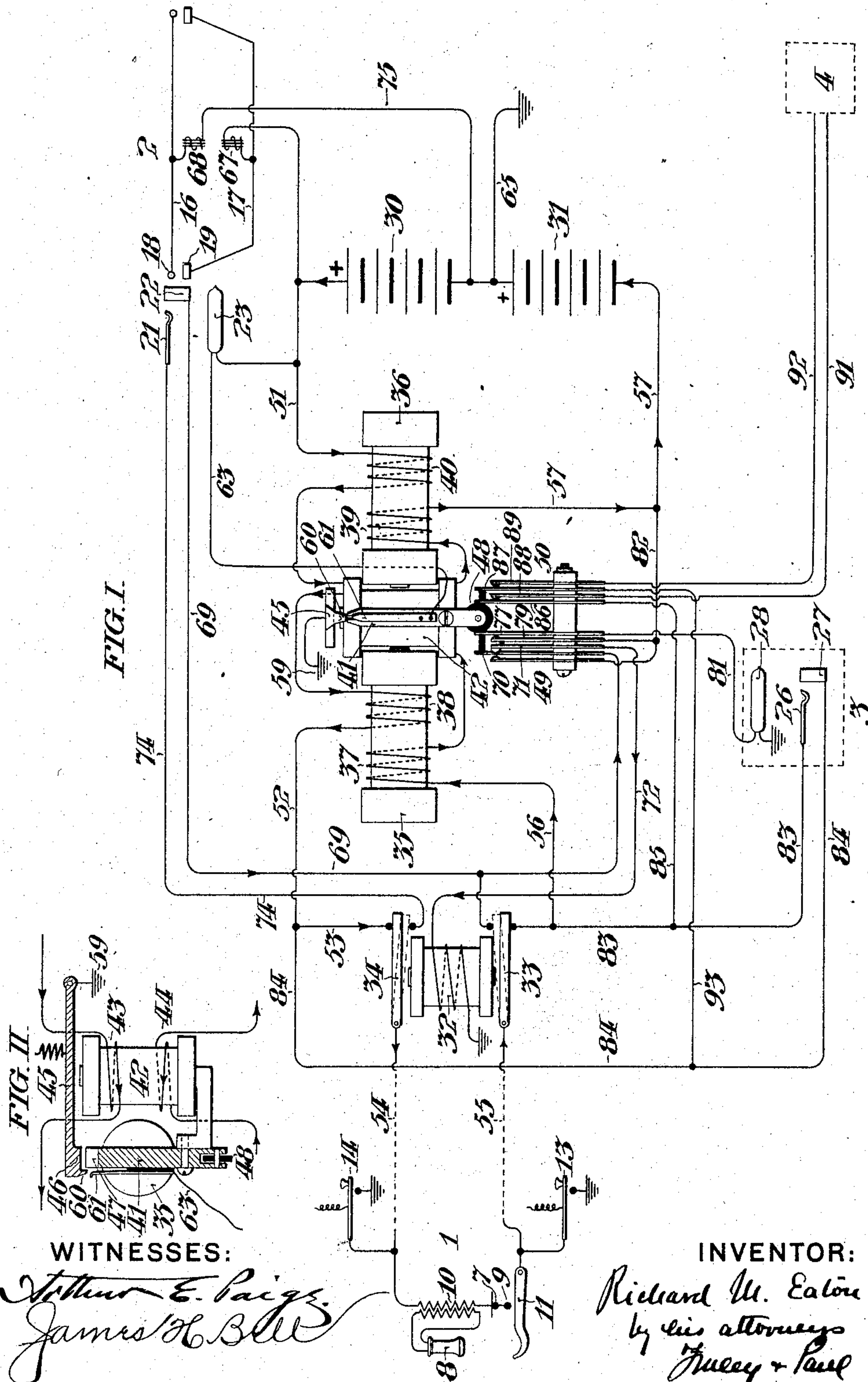
PATENTED OCT. 25, 1904.

R. M. EATON.  
TELEPHONE SYSTEM.

APPLICATION FILED DEC. 31, 1901.

NO MODEL.

3 SHEETS—SHEET 1.



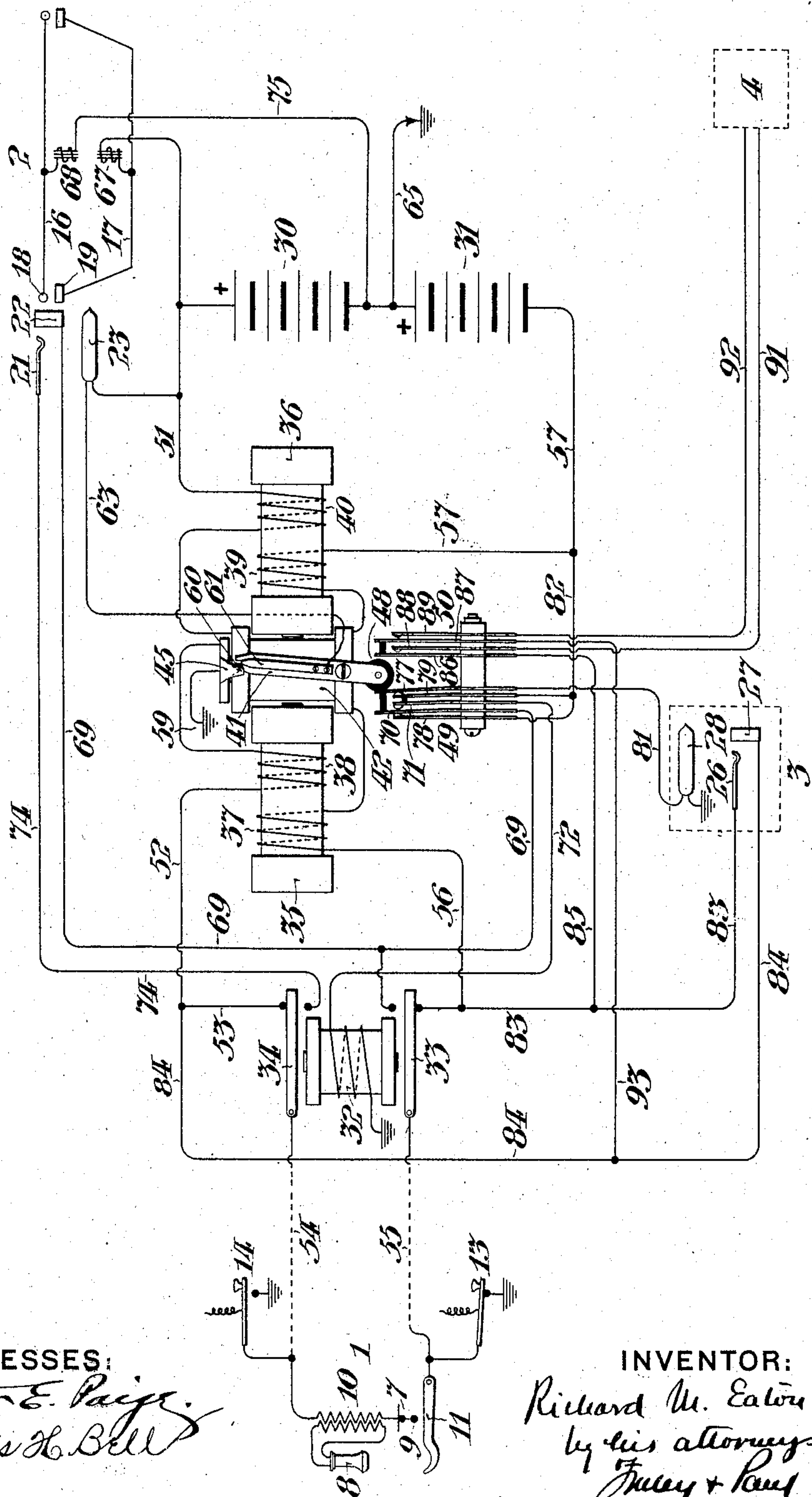
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NO MODEL.

3 SHEETS—SHEET 2.

FIG. III.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

RICHARD M. EATON, OF PHILADELPHIA, PENNSYLVANIA.

## TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 773,007, dated October 25, 1904.

Application filed December 31, 1901. Serial No. 87,887. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD M. EATON, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Telephone Systems, whereof the following is a specification, reference being had to the accompanying drawings.

My improvements are applicable to ordinary telephone systems comprising subscribers' stations which are placed in communication with each other through a central station or exchange where a charge may be registered against the subscriber who makes the call.

It is an object of my present invention to include in such a system a special station or stations and means whereby the subscribers may call the same without the intervention of the central station, and consequently without the registration of a charge against the calling subscriber. Such a special station may be advantageously employed in the establishment of a bureau of information or of commerce, with which the subscribers may communicate at will and without charge to them, arrangements being made to charge such calls to the account of the special station, or such a special station may be provided with means to furnish stock-quotations, phonographic entertainment, or similar service, which the subscribers may secure at will and without charge to them; but my invention is not limited to additional circuits for these purposes, but extends to the combination of the circuit connecting a subscriber with the central station and one or more additional circuits wholly under the control of the subscriber and, if desired, free from the possibility of interruption or control by the central station.

As a typical illustration of my invention I shall herein set forth a system embodying single stations of each of the classes above specified, the two special stations being respectively designated as the "bureau-station" and the "entertainment-station." Said system comprises means whereby a busy-test signal similar to that manifested while two subscribers are in communication through the central station is manifested to the central-station operator upon any attempt to call a

subscriber's station which is in communication with the bureau-station, and a positive check interposed against the interruption by the central station of the circuit established at the will of the subscriber between the subscriber's station and the bureau-station. Moreover, as it is desirable that a subscriber shall not be excluded from the calls of the other subscribers in the system while in communication with the entertainment-station I have provided means to permit the central-station operator to call the subscriber's station while the latter is in communication with the entertainment-station. As hereinafter described, an automatically-operative relay-switch controls communication between the central station and the subscriber's station and serves to check interruption and permit interruption under the conditions noted, said switch being excluded from connection with the central station when communication is established between the subscriber's station and the bureau-station and being in circuit with the central station when the subscriber's station is in communication with the entertainment-station.

My invention comprises the various novel features of construction and arrangement hereinafter more definitely specified and claimed. It is to be understood, however, that I do not desire to limit my invention to the particular combinations above specified.

In the accompanying drawings, Figure I is a diagram of a system including one subscriber's station, the central station, the bureau-station, and the entertainment-station and the various devices by which communication is established between them, which devices are shown in the normal position. Fig. II is a sectional view of the automatic switch mechanism. Fig. III is a diagram similar to Fig. I, but showing the apparatus in position to call the bureau-station. Fig. IV is a diagram similar to Fig. I, but showing the apparatus in position to call the entertainment-station.

In said figures, 1 is the subscriber's station; 2, the central station; 3, the bureau-station, and 4 the entertainment-station. Said subscriber's station comprises the transmitter 7, the receiver 8, the induction-coil 10, the hook,



lever 11, and the two special switch-levers 13 14. Said switch-lever 13 is arranged to connect the subscriber's station with the bureau-station 3, and said switch-lever 14 is arranged to connect said subscriber's station with the entertainment-station 4.

The central station comprises the cord-circuits 16 17, provided with the corresponding plug-terminals 18 19, which are adapted to engage with the subscriber's socket-terminals 21 22, adjoining the subscriber's signal-lamp 23. The bureau-station 3 comprises the socket-terminals 26 and 27 and the signal-lamp 28. It is to be understood that the entertainment-station 4 comprises suitable devices for transmitting stock-quotations or whatever other service is required.

The batteries 30 and 31 are conveniently located at the central station, together with the electromagnet-relay, comprising the coil 32 and the switch-lever armatures 33 and 34. The automatic switch mechanism for controlling the circuits between the stations is also conveniently located at the central station and includes the opposed switch-magnets 35 and 36, the former comprising separate coils 37 and 38 and the latter comprising separate coils 39 and 40, so arranged as to alternately act upon the armature 41, which is polarized by its connection with the electromagnet 42, comprising the coils 43 and 44, as best shown in Fig. II. Said electromagnet 42 is provided with an armature-detent 45, whose wedge-shaped extremity 46 is arranged to either lock the polarized armature 41 in normal position intermediate of said opposed electromagnets 35 and 36 by engagement in the notch 47 in the free extremity of said armature 41 or to maintain said armature 41 in alternate positions of deflection toward either of said electromagnets 35 and 36 by engagement with the respectively opposite sides of said armature. The lower extremity of said armature 41 is provided with the insulated roller 48, which, in accordance with the position of said armature 41, operates one or the other of two switches—to wit, the switch 49 to control the connections between the subscriber's station 1 and the bureau-station 3 or the switch 50 to control the connections between the subscriber's station 1 and the entertainment-station 4.

Referring to Fig. I, which shows the normal position of the devices above described, it is to be understood that when it is desired to establish communication between the subscriber's station 1 and the central station 2 the receiver 8 is uplifted from the hook-lever 11, which latter makes contact with the terminal 9, so that a circuit is completed, as indicated by the arrows, from the positive terminal of the battery 30 through the conductor 51, coil 40 of the electromagnet 36, coil 43 of the detent-magnet 42, coil 38 of the switch-magnet 35, wires 52 53, relay-switch 34, wire 54, sub-

scriber's induction-coil 10, transmitter 7, hook-lever 11, wire 55, relay-switch 33, wire 56, switch-magnet coil 37, detent-magnet coil 44, switch-magnet coil 39, wire 57, and batteries 31 and 30. The circuit being established through the four switch-magnet coils 37, 38, 39, and 40, said coils neutralize each other, and the armature 41 remains in intermediate position and is there locked by the detent-armature 45, which is operated by the energized coils 43 and 44, so that its detent 46 is engaged in the notch 47 in the armature 41. Said detent-armature 45 is grounded at 59 and provided with the contact-point 60, which in the intermediate locked position of the parts just described makes electrical connection with the spring-terminal 61, which is carried by but insulated from the armature 41, as best shown in Fig. II. Said terminal 61 is connected by the wires 63 with the subscriber's signal-lamp 23, so that when the armature 41 is locked said lamp 23 is operated by the circuit extending from the positive terminal of the battery 30 through the lamp 23, wire 63, terminal 61, contact-point 60, armature 45, ground 59, and return ground-wire 65 of the battery 30. Upon the manifestation of the subscriber's signal 23 the central-station operator connects the plug-terminals 18 and 19, respectively, with the subscriber's socket-terminals 21 and 22. The first result of said connection is to operate the relay 32 by the establishment of the circuit extending from the positive terminal of the battery 30 through the reactance-coil 67, cord-circuit 17, plug-terminal 19, socket-terminal 22, wire 69, spring-terminals 70 and 71 of the switch 49, wire 72, relay-coil 32, and ground to the ground-wire 65 of the battery 30. Said relay-coil 32 being thus energized the relay-switch levers 33 and 34 are thereby shifted to the position indicated in dotted lines in Fig. I, so that the special switch mechanism 35 36, &c., is cut out and direct connection made between the subscriber's station and the central station 2, as follows: from the positive terminal of the battery 30 through the reactance-coil 67, cord-circuit 17, plug-terminal 19, socket-terminal 22, wire 69, relay-switch 33, wire 55, subscriber's hook-lever 11, contact 9, transmitter 7, and induction-coil 10, wire 54, relay-switch 34, wire 74, socket-terminal 21, plug-terminal 18, cord-circuit 16, reactance-coil 68, wire 75, and battery 30. It is to be noted that as long as the cord-circuit plug-terminals 18 and 19 are in connection with the subscriber's socket-terminals 21 22 the relay-coil 32 is energized to retain the relay-switches 34 35 in the dotted position shown in Fig. I, and it is to be understood that while said connection is made the central-station operator may connect the subscriber's station 1 by said cord-circuit with the socket-terminals of any other subscriber with the same facility as if the special switch mechanism 35 36, &c., was not comprised in the



system. The parts being restored to normal position communication may be established between the subscriber's station 1 and the bureau-station 3 at the will of the operator, as follows: The special switch 13 at the subscriber's station 1 is depressed, as indicated in Fig. III, to connect with the ground, so that a circuit is established extending from the positive terminal of the battery 31 through the ground and said switch 13, wire 55, relay-switch lever 33, wire 56, switch-magnet coil 37, detent-magnet coil 44, switch-magnet coil 39, wire 57, and battery 31. The establishment of the circuit described polarizes the armature 41, which being drawn toward the switch-magnet 36 is locked in the position shown in Fig. III by the lateral engagement of the detent-armature 45, which latter is drawn down by the action of the energized coil 44 of the detent-magnet 42. It being noted that the above-described operation requires the action of the armature 41 before the armature 45, it is to be understood that this result may be due to the fact that the armature 41 has a less distance to travel to escape engagement with the armature 45 than the latter has to travel to engage in the notch 47 of the armature 41. However, the electromagnet 42 is preferably so constructed or arranged as to act slowly—that is to say, the retracting-spring of its armature 45 may be so arranged that the latter is not shifted to the position for engagement with the armature 41 until the current reaches its full value in the magnet 42—or the inertia of the device may be increased by any other suitable means. The above-described deflection of the armature 41 causes the insulated roller 48 to bring the coupled spring-terminals 70 and 77 of the switch 49 into respective contact with the spring-terminals 78 and 79 of said switch, thereby operating the bureau-signal lamp 28 by a circuit extending from the positive terminal of the battery 31 through the wire 65 and ground to the lamp 28 and thence through wire 81, spring-terminal 77, spring-terminal 79, wire 82, wire 57, and battery 31. Said deflection of the armature 41 also establishes connection between the subscriber's socket-terminal 22 and said battery 31 by the wire 69, spring-terminal 70, spring-terminal 78, wire 82, and wire 57, so that upon any attempt of the central-station operator to connect the plug-terminals 18 and 19 with the subscriber's socket-terminals a signal is manifested to the central-station operator indicating that the subscriber's station 1 is busy, said signal consisting of the click sound produced by the contact of the plug-terminal 18 with the live-socket terminal 22. Moreover, it is to be noted that communication between the subscriber's station 1 and the bureau-station 3 cannot be interrupted by the central station, because the circuit through the relay-switch coil 32, wire 72, and switch-springs 70 71 is

broken by the separation of the latter. The bureau-station 3 being called by the operation of the lamp-signal 28, as above described, communication may be had between the subscriber's station 1 and said bureau-station through the wire 55, relay-switch 33, wire 83, bureau-socket terminal 26, bureau-socket terminal 27, wire 84, wire 53, relay-switch 34, and wire 54, said circuit of course including the telephone instruments of both the subscriber's station 1 and the bureau-station 3. The parts being restored to normal position communication may be established between the subscriber's station 1 and the entertainment-station 4, at the will of the operator, as follows: The special switch 14 at the subscriber's station 1 is depressed, as indicated in Fig. IV, to connect with the ground, so that a circuit is established extending from the positive terminal of the battery 30 through the wire 51, switch-magnet coil 40, detent-magnet coil 43, switch-magnet coil 38, wires 52 and 53, relay-switch 34, wire 54, switch 14, and the ground to the return-wire 65 of said battery 30. The establishment of the circuit above described polarizes the armature 41, which is drawn toward the switch-magnet 35 and locked in the position shown in Fig. IV by lateral engagement with the detent-armature 45, which latter is drawn down by the action of the energized coil 43 of the magnet 42. The aforesaid deflection of the armature 41 causes the insulated roller 48 to press the coupled spring-terminals 86 and 87 of the switch 50 into respective contact with the spring-terminals 88 and 89 of said switch, thereby connecting the subscriber's station 1 with the entertainment-station 4 by a circuit extending through the wire 55, relay-switch 33, wire 83, wire 85, switch-terminal 86, switch-terminal 88, wire 91, through the instruments at the entertainment-station 4, and returning through the wire 92, switch-terminal 89, switch-terminal 87, wire 93, wire 84, wire 53, relay-switch 34, and wire 54, said circuit of course including the telephone instruments of both the subscriber's station and the entertainment-station.

It is to be noted that while communication is established between the subscriber's station 1 and the entertainment-station 4 there is no busy-signal manifested at the central station 2 and that said communication may be interrupted by another subscriber's station being placed in communication with subscriber's station 1 through the intervention of the central station.

For clearness of illustration various adjunctive devices which are conveniently employed in telephone systems have been omitted from the diagrams illustrating the present invention, and it is to be understood that I do not desire to limit myself to the precise construction and arrangement which I have shown, as it is obvious that various modifications may



be made therein without departing from the essential features of my invention.

I claim—

1. In a telephone system, the combination  
5 with a central station; of a plurality of subscribers' stations between which communication may be established through the central station; of a special station connected directly with one of said subscribers' stations; and  
10 means, including a movable member located at said subscriber's station, whereby communication may be had selectively either with the central station and the other subscribers' stations connected therewith, or with said special  
15 station, substantially as set forth.

2. In a telephone system, the combination with a central station; of a plurality of subscribers' stations between which communication may be established through the central  
20 station; of a special station connected directly with one of said subscribers' stations; means, including a movable member located at said subscriber's station, whereby communication may be had selectively either with the central  
25 station and the other subscribers' stations connected therewith or with said special station; and, means to manifest a busy-test signal at the central station while said subscriber's station is in communication with the special sta-  
30 tion, substantially as set forth.

3. In a telephone system, the combination with a central station and a subscriber's station; of a bureau-station and an entertainment-station connected directly with said sub-  
35 scriber's station; means, including a movable member at the subscriber's station, whereby communication may be had selectively with the central station or with either of said special stations; means to manifest a busy-test signal  
40 at the central station while the subscriber's station is in communication with said bureau-station; and, means to permit the calling of the subscriber's station from the central station, while the former is in communication  
45 with the entertainment-station, substantially as set forth.

4. In a telephone system, the combination with a subscriber's station, a special station and circuits between said stations; of auto-  
50 matic switch mechanism for said circuits, located at the central station and comprising an armature; opposed electromagnets in alternately-operative relation with said armature; a detent adapted to engage said armature in  
55 normal position intermediate of said opposed electromagnets and in position of deflection toward either of them; and, an electromagnet arranged to polarize said armature and to operate said detent, substantially as set forth

60 5. In a telephone system, the combination with a subscriber's station, two special sta-

tions and circuits between said stations; of automatic switch mechanism for said circuits, comprising an armature; opposed electromag-  
65 nets in alternately-operative relation with said armature; a detent adapted to engage said armature in normal position intermediate of said opposed electromagnets and in position of deflection toward either of them; an electromag-  
70 net arranged to polarize said armature and to operate said detent; two switches respectively controlling the circuits between said subscriber's station and the respective special stations; and means operatively connecting said arma-  
75 ture with said two switches, substantially as set forth.

6. In a telephone system, the combination with a central station and a subscriber's station; of a special station connected directly with said subscribers' stations; means, includ-  
80 ing a movable member at the subscriber's station, whereby communication may be had selectively either with the central station or with said special station; and, a relay arranged to break connection between said subscriber's  
85 station and said special station when communication is established between said subscriber's station and said central station, substantially as set forth.

7. In a telephone system, the combination  
90 with a subscriber's station; of a central station; wiring connections between said stations; a special station; and, means whereby the establishment of communication between the subscriber's station and the special station  
95 is wholly under the control of the subscriber, and when established cannot be interrupted by the central station, substantially as set forth.

8. In a telephone system, the combination  
100 with a subscriber's station; of a central station; wiring connections between said stations; a special station connected with means whereby the establishment of communication between it and the subscriber's station is  
105 wholly under the control of the subscriber, and when established cannot be interrupted by the central station; and a second special station, connected with means whereby the establishment of communication between it  
110 and the subscriber's station is under the control of the subscriber, but when established may be interrupted by the central station, substantially as set forth.

In testimony whereof I have hereunto signed  
115 my name, at Philadelphia, Pennsylvania, this 28th day of December, A. D. 1901.

RICHARD M. EATON.

Witnesses:

JAMES H. BELL,  
C. BRADFORD FRALEY.