

(No Model.)

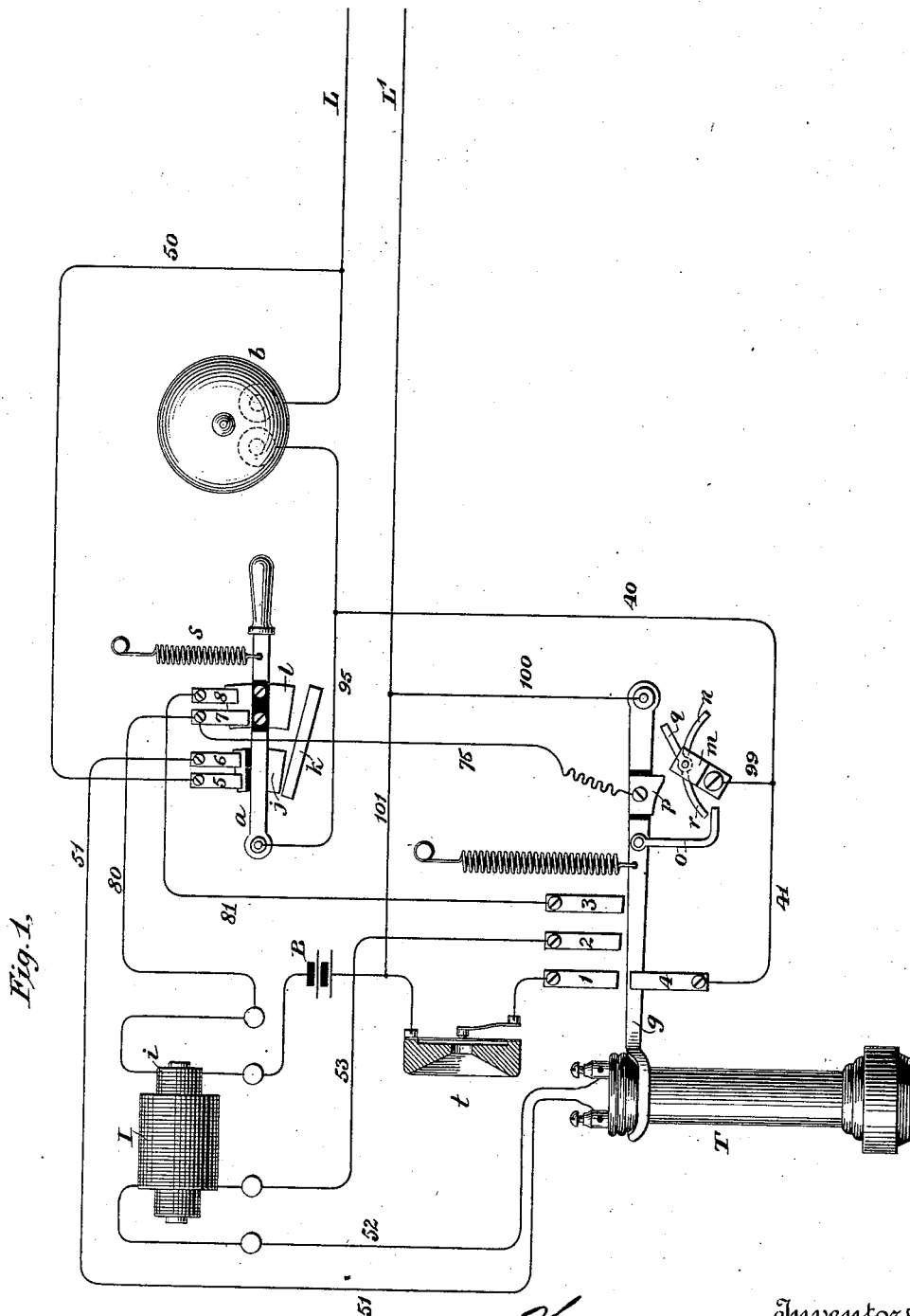
2 Sheets—Sheet 1.

T. N. VAIL & J. A. SEELY.

TELEPHONE SUB-STATION APPARATUS.

No. 385,975.

Patented July 10, 1888.



Witnesses

Geo. W. Breck  
Carrie E. Ashley

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 By their Attorney *Wm. B. Vansig.*

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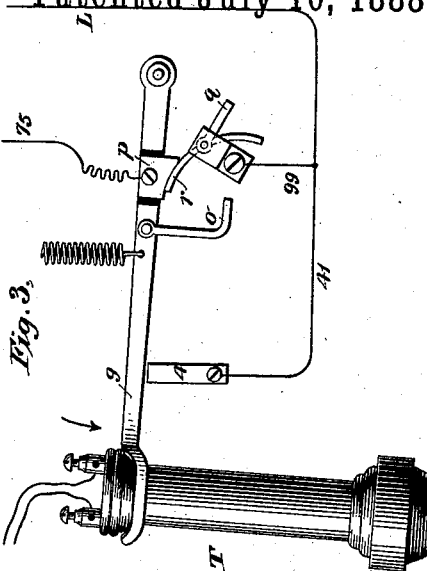
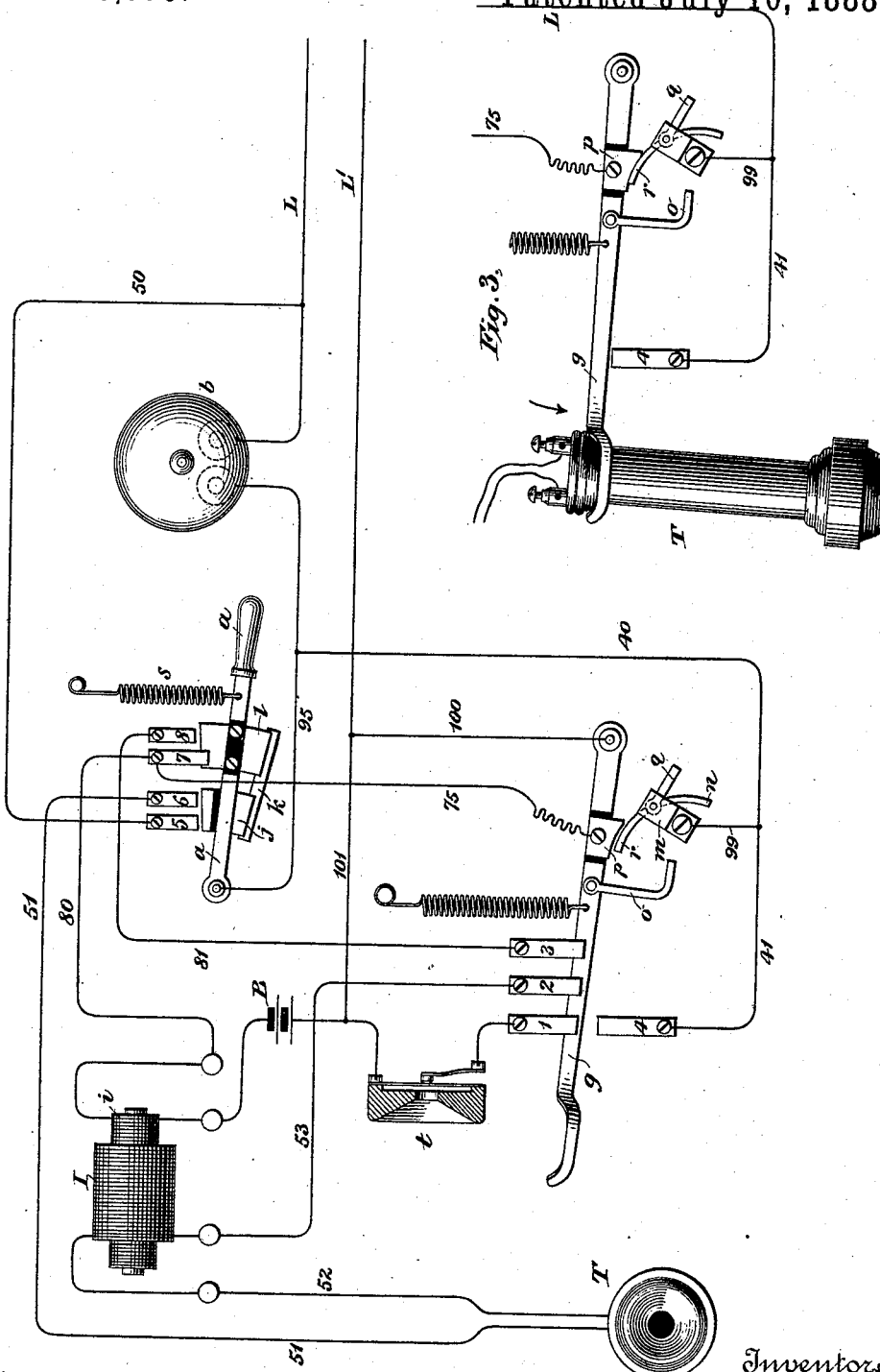
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Fig. 2.



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# UNITED STATES PATENT OFFICE.

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## TELEPHONE SUB-STATION APPARATUS.

SPECIFICATION forming part of Letters Patent No. 385,975, dated July 10, 1888.

Application filed February 25, 1888. Serial No. 265,297. (No model.)

*To all whom it may concern:*

Be it known that we, THEODORE N. VAIL and JOHN A. SEELY, citizens of the United States, and residents, respectively, of Boston, county of Suffolk, State of Massachusetts, and of the city, county, and State of New York, have jointly invented certain new and useful Improvements in Telephone Sub-Station Apparatus, of which the following is a specification.

Our invention is an improvement in the arrangement of switches, circuits, and apparatus for use at a sub-station in a telephone-exchange.

The arrangement is designed for use in connection with our improved arrangement of apparatus at a central station, described and claimed in another application for Letters Patent filed by us February 25, 1888, Serial No. 265,298.

We will assume that the central-station operator has a telephone continuously within audible distance and reproducing or receiving telephonic communications from a series of circuits, means for connecting any two circuits, means for ringing up, means for listening in connected circuits, clearing-out annunciators, and all other necessary appurtenances to a telephone central-station exchange, and that the sub-station has the usual arrangement of gravity-switch, main-line branches, hand-telephone, and current-varying transmitter, with one or more cells of local battery, but no magneto-generator.

It is our design that a subscriber on one circuit desiring to communicate with a subscriber on a second circuit shall be connected by the central station upon request, and for that purpose the subscriber shall proceed as follows: Removing the telephone from its support upon the gravity-switch without preliminary ringing or signaling, he speaks his own number or designation and the number or designation of the desired correspondent. He immediately follows this by connecting a generator of electricity giving a constant current into the line. This will energize his electro-magnetic bell, bringing its armature into an attracted position. If the central station has heard his call, his circuit will be momentarily broken while the necessary connection is being made at the

central station, and the act of breaking circuit is rendered audible upon the sub-station bell in the form of, say, one or two strokes. The generator is now removed and the telephone may be again taken from its position of rest and conversation carried on until finished. The gravity-switch is so improved by us that the act of hanging up the telephone sends an impulse of electricity from a generator to the central-station clearing-out annunciator; but the operation of removing the telephone does not produce such an effect. The connection is now broken at the central station by the operator, who has noticed the fall of the clearing-out annunciator-drop.

For the purpose of connecting a battery or generator to line after a call and before a connection is made we provide a supplementary spring-retracted switch-arm, with connections so arranged as to introduce a cell of battery into the line when the normal position of said arm is varied, as by depressing it.

Our improved arrangement, then, while operating harmoniously with our improved central-station apparatus, obviates the necessity for a magneto-bell, which is so expensive and somewhat liable to disarrangement. At the same time the necessary operations of a subscriber are simplified, enabling us to attain increased speed and great expedition in securing the desired connection.

The accompanying drawings illustrate our invention.

Figure 1 shows the apparatus in its normal position. Fig. 2 shows the telephone off the gravity-switch arm, the request having been transmitted, and the supplementary arm depressed, awaiting a return-signal. Fig. 3 shows the telephone just placed upon its hook and the arm in its descent closing contact to ring off automatically.

Referring to Fig. 1, *g* is the usual arrangement of gravity-switch applied to a metallic circuit, L.I./.. There is added an insulated contact, *p*, connected by a wire, 75, to a point in the local circuit 7. *m* is a fixed bearing supporting the three-armed lever *n q r*, freely movable, but having the position of its center of gravity varied by the position of the arm *q*. *o* is a hook attached to arm *g*, taking against the lever-arm *r* when the switch-arm *g* ascends.

This three armed lever is what might be called a "tumbler lever," and is electrically connected by wires 99 and 40 to a point in the main circuit L. When the telephone is lifted from the hook, *o* engages with *r*, and after carrying 5 *r* a short distance so far changes its center of gravity that it falls into the position shown in Fig. 2, no effective electrical contact being established. When the telephone is hung upon 10 arm *g*, the descent of said arm, as represented in Fig. 3, establishes contact between *p* and *r*, thus temporarily connecting battery B into the main line *via* elements L 40 99 *m r p* 75 80 *i* B 101 to L', and the three armed lever falls 15 into the normal position shown in Fig. 1. It will thus be seen that a battery is connected to line only when the telephone is hung up, as at the conclusion of a conversation.

The second improvement upon the ordinary 20 and well-known arrangement at a sub-station consists in the use of a supplementary switch-arm, by the operation of which a generator may be connected to the main circuit for the purpose of signaling.

5 *a* is a spring-retracted pivoted lever.

*l* is a conducting-plate fixed to an insulating-bushing upon the lever *a*.

*j* is a similarly-placed uninsulated conducting-plate. *k* is a fixed contact for electrically 30 uniting *j* and *l*. Conducting-strips 5 and 6 are the terminals of the divided telephone branch 50 51. Conducting-strips 7 and 8 are the terminals of the divided primary circuit 80 81 of the transmitter *t*.

35 When the supplementary lever *a* is depressed, circuit passes *via* elements L *a j k l* 7 80 *i*, battery B, 101 to L'.

The operation of transmitting a call and communicating telephonically is as follows:

40 The apparatus being in its normal position, as shown in Fig. 1, telephone T is lifted from its hook and the gravity-switch *g* changes circuit from the bell branch *via* L *b* 40 41 4 *g* 100 L', as shown in Fig. 1, to the telephone branch 45 *via* elements L 50 5 *j* 6 51 T 52 I 53 2 *g* 100 L', as shown in Fig. 2, and tilts the three armed lever *n q r* into the position there shown. Without preliminary signaling, the required connection is vocally communicated, the telephone placed in its normal position, and the lever *a* immediately depressed, circuit now 50 being, as shown in Fig. 2, *via* elements L *b a j k l* 7 80 *i* B 101 to L'. The bell-magnet armature is attracted by the closed electrical circuit, but the operator at the central station in responding to this request incidentally breaks this circuit in transferring the calling-line into connection with the required line, and the bell-magnet armature drops off during such 55 break, thus indicating to the sub-station that the call was received and acted upon. The sub-station then allows arm *a* to resume its normal position, and, taking down the telephone, speaks into the transmitter *t* in the usual manner. After finishing the conversation, the telephone is restored to its position. Fig. 3 shows the connection between *p* and *r*

established by this operation. Circuit being temporarily *via* elements L 40 99 *m r p* 75 7 80 *i* B 101 to L', the ringing off drop at the 60 central station falls and the said station returns the wires to their normal position.

It is to be noticed that in case the central-station operator does not receive and respond to the first announcement of a required connection the operation of replacing the telephone and depressing arm *a* has connected 65 battery to line and the clearing-out annunciator has been operated, so that in no case will the sub-station fail to receive proper attention. 80

We may employ a separate battery for use in calling, instead of using the transmitter-battery for all requirements.

What we claim, and desire to secure by Letters Patent, is— 85

1. The combination, at a telephone-station, of a switch or circuit changer consisting of a pivoted arm connected with the main line, an electrical contact connected with a main-line branch containing a telephone, a second electrical contact connected with a main-line 90 branch containing an electro-magnet for operating a call or signal, an electrical contact connected to a generator of electricity, an electrical contact connected to the main line, and 95 means, substantially as described, for temporarily connecting the two last-named contacts upon movement of the arm in one direction only.

2. At a telephone-station, a switch or circuit changer consisting of a pivoted arm forming a support for the telephone and capable of movement in two directions, a retractor for producing one movement, the gravity of the telephone when placed thereon producing 100 the other movement, a main line connected to said arm, an electrical contact connected to a main-line branch containing a telephone, and a contact connected to a main-line branch containing an electro-magnetic signaling-instrument, in combination with two additional 105 contacts, one of which is connected to the main line, the other to a generator of electricity, and a tumbler-lever temporarily forming an electrical connection between the last-named 110 contacts upon a movement of the arm in one direction only. 115

3. At a telephone-station, a switch or circuit changer having a contact with the main line, a contact with a telephone branch, and a contact 120 with a bell branch, combined with a second switch or circuit changer having two contacts, the first connected to a generator of electricity and the second to the main circuit, whereby, with the second switch is operated, the generator and main line are connected during the process of calling and preliminary to conversation. 125

4. The combination, at a telephone-station, of a main line, a contact-varying telephonic transmitter, a local battery for said transmitter, an electrical connection from one side of said battery to the main line, and a switch or circuit changer having a fixed contact and a 130

movable contact, and an electrical connection from one of said points to the battery and from the other contact to the line, all arranged substantially as described, whereby the operation  
5 of the switch includes the said battery in the line for the purpose of signaling.

5. The combination, at a telephone sub station, of a main line, a branch line containing a bell or signaling-instrument, a second  
10 branch containing a contact-varying telephone-transmitter, a local circuit therefor, means for connecting either of said branches with the main line, a supplementary switch

or circuit changer embracing a pair of circuit-closing points in the local circuit, a pair of  
15 circuit-closing points in the transmitter branch, and a movable arm normally in position to close both said pairs of points, a battery-contact, and a main-line contact electrically united by the operation of said switch. 20

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