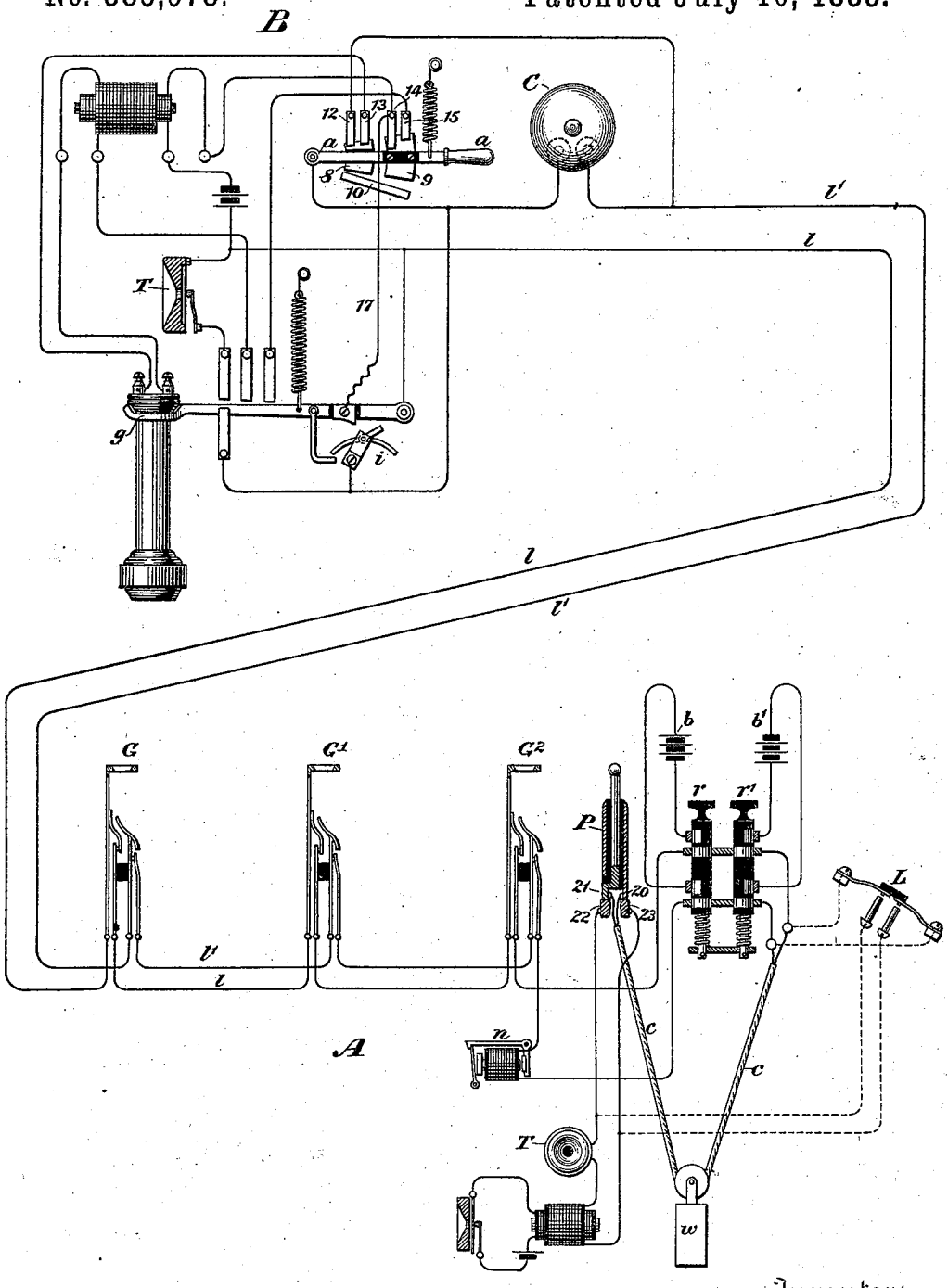
(No Model.)

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

TELEPHONE EXCHANGE SIGNALING.

No. 385,978. Patented July 10, 1888.



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UNITED STATES PATENT OFFICE.

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TELEPHONE-EXCHANGE SIGNALING.

SPECIFICATION forming part of Letters Patent No. 385,978, dated July 10, 1888.

Application filed March 1, 1888. Serial No. 265,784. (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-Exchange Signaling, of which the following is a specification.

Our invention is an improvement in the arrangement of apparatus for telephonic signaling between sub-station and central station.

In our improved arrangement of telephone-exchange apparatus we avoid the necessity for the use of special indicating devices to receive calls or requests from sub-stations, and we only use an annunciator for clearing-out purposes.

Our improvement consists in connecting every sub station line of a group with an operator's head telephone at a central station, and in terminating every sub-station line of a group in a flexible connecting-cord normally resting by force of a gravity take-up upon conductors or connections forming the terminals of an operator's head telephone. By this means no preliminary signal is necessary, the sub-station merely holding his telephone and speaking into the transmitter his own number or designation and the number or designation of the sub-station required. At the sub-station we provide means for including a generator of electricity yielding a steady current in the circuit. This is to be done immediately after speaking or announcing the correspondent desired, and the call being received at the central station the operator lifts the jack-plug forming the terminal of the calling-line preparatory to placing it in the jack of the called-for station's line. The act of lifting the plug temporarily breaks the circuit, and the armature of the bell-magnet at the sub-station drops off, sounding one or more strokes, signifying to the sub-station that the call is received and acted upon—that is, it operates as a return-signal to the request.

The accompanying drawing illustrates our invention.

1 is a subscriber's circuit, here shown as a metallic circuit uniting central station, A, and sub-station B. At A there is a multiple-board arrangement. G, G', and G² are three spring-jacks on three separate boards, through each and all of which the wire 1 passes. This circuit 1 belongs to a group assigned to board G², let us suppose. It terminates in a flexible cord, *c*, and jack-plug P, held in position by a gravity take-up, *w*. The two conductors forming opposite sides of the metallic circuit terminate in electrical contacts 20 21 on the base of the plug.

22 and 23 are electrical contacts forming the terminals of a local circuit containing an operator's head telephone-set, T. These contacts are in such a position that contacts 20 21 of the plug rest thereon when the plug is in its normal position, as shown, so that the circuit 1 normally includes an operator's telephone-set.

At the sub-station B there is a telephone-set, T, consisting of a hand-telephone, a contact-varying transmitter with its local battery, known and the well arrangement of gravity-switch for changing the main-line circuit from the bell branch to the telephone branch, and vice versa, and for making and breaking the transmitter local circuit. In addition it is furnished with a tumbler-lever, *i*, and special battery-connection 17 for connecting battery to line when the gravity-switch is moving in one direction only to operate as a "ring-off" signal, this arrangement and apparatus being described and claimed in an application for United States Letters Patent filed by us on February 25, 1888. At the sub-station there is also a supplementary switch-arm, *a*, normally closing contacts 12 13 in the telephone branch and 14 15 in the circuit of the local battery. Lever *a* carries electrical connections 8 in two insulated sections, one of which (the lower) is electrically connected to arm *a*, the other, 9, is insulated from arm *a*.

10 is a fixed electrical contact or strip of metal, which, when *a* is depressed, unites contacts 8 and 9.

The described apparatus operates as follows: Telephone T at the central station is continuously in audible distance with respect to the operator. The sub-station lifts his telephone and vocally announces his own number and that of the desired station. He then immediately depresses lever *a*. This throws the local

battery of the sub-station into the main line, circuit being *via* 1, local battery 14 9 10 8 *a* to 1′ through the plug and telephone at the central station. The circuit is closed and armature of bell C is attracted. The operator at the central station has heard the call, however, and immediately lifts plug P preparatory to placing it in the called-for-line jack, but this act breaks the circuit 1 1′ temporarily, the armature of bell C falls off, striking the gong, and this indicates to the sub station that his call was received and acted upon. He then allows the spring retracted arm *a* to resume its normal position and carries on a conversation with the distant station. When through his communication, the act of restoring the telephone temporarily connects *i* and 17, thus again including the local battery in the main line. This drops the annunciator *n* and the central-station operator restores the normal conditions. There is provided at the central station devices *r r′* for ringing in either direction through the batteries *b b′*, and there is a looping-in device, L.

We do not herein claim the arrangement of apparatus shown and described at the sub-station, nor that shown and described at the central station, as that forms the subject-matter of applications filed by us on or about February 25, 1888; but

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

1. The combination of a central station and a sub-station united by an electrical conductor at the central station, a circuit-changing device consisting of a switch-plug normally forming part of said circuit at the sub-station, a gravity-switch, a telephone branch, a bell branch, a generator of electricity, and a switch for including said generator in the main circuit, consisting of a pivoted arm operating a line-contact, and a contact connected to said generator, whereby a change in the normal position of said switch at the sub-station and of said apparatus at the central station produces a signal irrespective of the position of the gravity-switch, substantially as described.

2. The combination of a central station and a sub-station, an electrical conductor uniting said stations, telephone-instruments in said circuit at both stations, a flexible conductor at the central station normally resting upon a section of conductor to complete said circuit, a generator of electricity at the sub-station, and a switch for including said generator in the circuit, all arranged substantially as described, whereby a change in the normal position of the flexible cord sounds a signal at the sub-station.

3. The combination of two telephone-stations, an electrical conductor uniting said stations, a fragment of said conductor containing an electro-magnetic indicating-instrument at each station, a device at one station—say the first—for connecting and disconnecting said fragment with respect to the main circuit, a generator of electricity, and a device for connecting and disconnecting said generator with respect to said conductor at the second station, all arranged and operating substantially as described, whereby a variation in connection of the line-fragment at the first station changes the circuit of the generator and sounds a signal at the second station.

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