

(No Model.)

J. I. SABIN & W. HAMPTON.
SINGLE LINE TELEPHONE SYSTEM.

No. 517,243.

Patented Mar. 27, 1894.

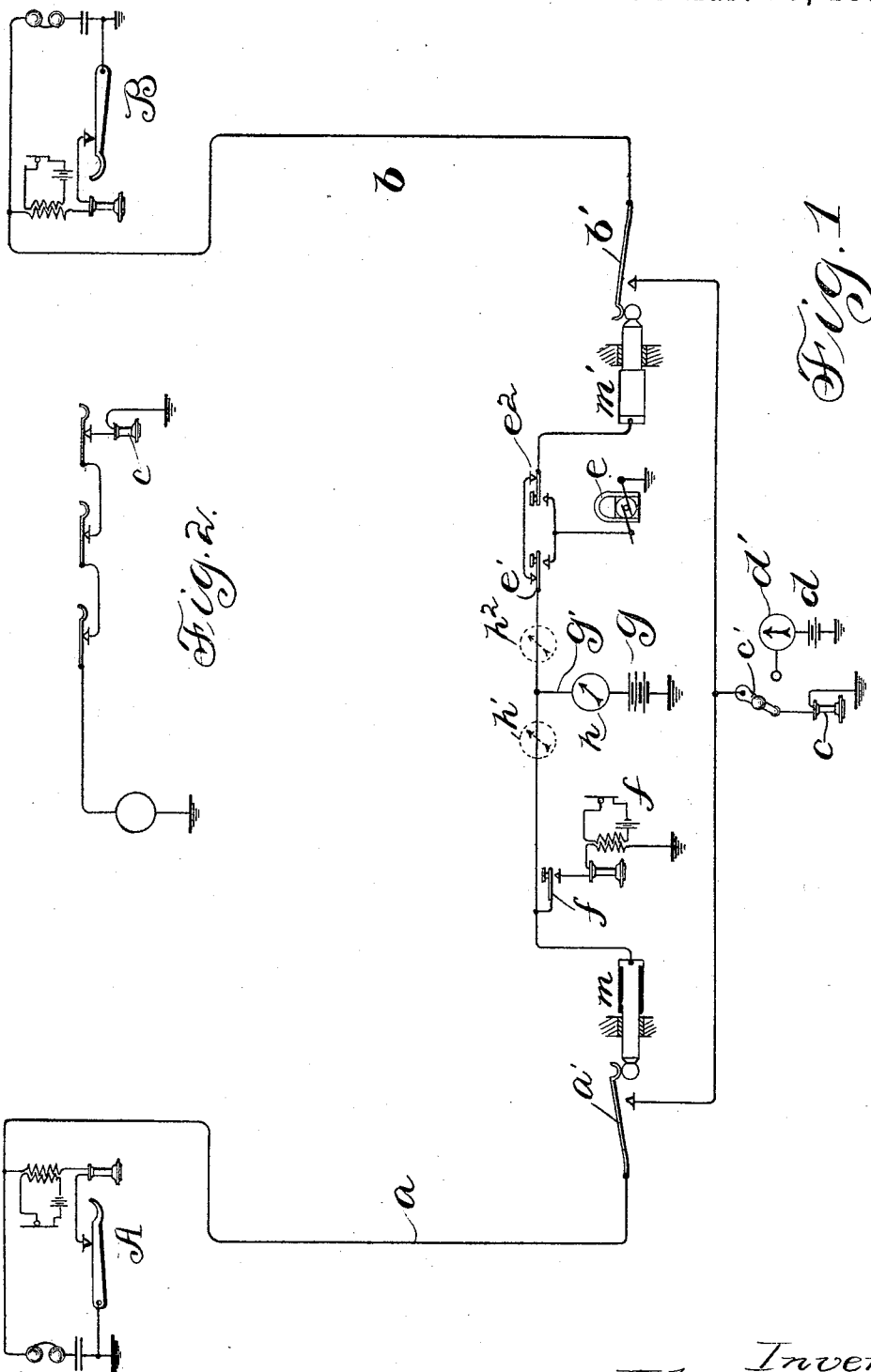


Fig. 2.

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SINGLE-LINE TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 517,248, dated March 27, 1894.

Application filed March 13, 1893. Serial No. 465,791. (No model.)

To all whom it may concern:

Be it known that we, JOHN I. SABIN and WILLIAM HAMPTON, citizens of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in a Subscribers' Signaling and Clearing System for Single-Line Telephone-Circuits, of which the following is a specification.

Our invention relates to telephone systems, and its object is to provide a system wherein the subscribers may secure connection in a minimum time and with as little exertion as possible on the part of the operator and subscribers, and further to provide means whereby one of two connected subscribers may transmit to the operator, instead of the usual disconnecting signal, a selective signal indicating a desire for connection with some other subscriber.

Our invention consists in a telephone line extending to the central office an operator's telephone normally in connection therewith at the central office, means being provided at the subscribers' station whereby the subscriber may include his telephone set in circuit with said operator's telephone, clearing out apparatus being provided adapted to convey to the operator the signal for disconnection when the operator hangs up his telephone.

In the preferred embodiment of our invention we provide at the central office a spring jack, comprising a single line spring connected with the line. A contact anvil is provided against which the line spring normally rests, but away from which it is moved by the insertion in the spring jack of the connecting plug. This contact anvil is connected to ground through the operator's cap telephone, so that when the subscriber removes his telephone from the hook he connects his telephone in circuit with the operator and can transmit to her the number of the subscriber with whom he desires connection. As the contact anvils belonging to the spring jacks of all the subscribers at the switch board are connected through the operator's cap telephone, any one of the subscribers so connected may cut himself into circuit even though the operator be holding conversation with another subscriber. The operator becomes trained in attending to the various

calls, though several be calling for connection at once. The operator having received the number of the subscriber with whom connection is desired, connects the two subscribers by a pair of plugs connected by a single strand. Upon inserting the plugs in the spring jacks of the two subscribers, the line springs are lifted from their contact anvils and the operator's cap telephone is cut out of circuit. Should the operator desire to cut herself into the talking circuit to determine whether or not the subscribers are in conversation, this may preferably be done by an auxiliary telephone which may be connected to ground at central office. Should the operator desire to remove her cap telephone, a three point switch is provided, whereby she may switch her cap telephone out of circuit, and an indicator, and a battery into circuit, so that should any one desire connection she is informed of the fact by the indicator, since the battery circuit is closed therethrough when a subscriber removes his telephone from the hook.

The clearing-out apparatus employed has in its individual capacity been described and claimed in an application, Serial No. 470,229, filed by us April 13, 1893. A battery is included at the central station in a connection to ground, and a visual indicator is provided in said bridge, or two visual indicators are provided in the limbs of the circuit, one upon either side of said bridge. So long as the circuits remain closed at the subscribers' stations the battery current traverses the indicator, or indicators, to convey to the operator a visual signal that the subscribers are in conversation; but when the subscribers cease conversation and hang up their telephones, thereby opening the battery circuits the visual signal ceases and the operator is informed of the desire for disconnection.

We will describe our invention more in detail by reference to the accompanying drawings, in which—

Figure 1 represents diagrammatically in conventional form, two subscribers united for conversation. Fig. 2 illustrates a telephone line connected with a multiple switch board, the cap telephone being in a ground connection from the last board, so that it is cut out of circuit by the insertion of a plug at any board.

The subscribers are provided with grounded circuit lines extending to the central office at which the limb is connected with a line spring a' . Likewise the limb b of subscriber B is connected with the line spring b' .

The subscribers' station apparatus comprises the usual telephone set, circuit being normally open there-through but adapted to be closed by the removal of the telephone from the hook. In order to prevent the battery current at the central office from ringing the bell, a condenser is placed in the bell circuit, thereby rendering the same opaque to the battery current. Were other form of clearing out apparatus used, however, the subscribers' station apparatus might be variously modified, and we do not therefore limit ourselves to the construction of subscribers' station apparatus shown, which in its individual capacity forms the subject matter of an application, Serial No. 470,229, filed by us April 13, 1893. The operator's cap telephone c is included in a line to ground from the contact anvils, and a three point switch c' is provided, whereby the cap telephone may be cut out of circuit and the battery d and the operator's individual indicator d' may be cut into circuit. The operator's generator e is included in a ground line which may be connected with either plug by the depression of one of the keys $e' e^2$. The operator's listening-in telephone f is also included in a ground line, and a listening-in key f' is provided whereby she may connect herself into the talking circuit. A battery g is included in a ground line g' and when the subscribers are in conversation, that is, when their telephones are removed from the hooks, the circuits of the battery g are closed and the indicator h in the ground line, or the two indicators $h' h^2$,—shown in dotted lines—give the visual signal of connection.

We will now describe the various operations required for connecting two lines. Suppose subscriber A desires connection with subscriber B; he removes his telephone from the hook and is immediately in circuit with the operator's cap telephone. Having transmitted to her the number of subscriber B, the operator inserts the plugs m, m' in the spring jacks, thus cutting her cap telephone out of circuit and uniting the two subscribers' lines. She then depresses ringing key e^2 , throwing the current from generator e onto the line of subscriber B and ringing his bell. She may learn by the signals when subscribers are connected, or she may then bridge in her telephone set f to learn if the subscribers are in conversation, and in finding that they are throw it out again, when the subscribers are in connection. When the subscribers have completed conversation, they hang up their telephones. If the single indicator h is used the current through the indicator will not cease until both subscribers have hung up their

telephones. If the two indicators $h' h^2$ be used, current will cease through indicator h' when A hangs up his telephone and that through indicator h^2 when B hangs up his telephone. Should either A or B desire a re-connection with some other subscriber, he may signify his desire by not hanging up his hook, and the operator noting that but one of the subscribers desires disconnection will bridge her telephone into circuit to receive the new call; or, if she does not readily note that one subscriber has not hung up his hook he may call her attention by moving his telephone hook up and down, thus causing a vibration of the visual portion of the indicator. The indicators are usually made to display white for disconnection and black under conditions of rest, so that the rapid change from white to black readily attracts the operator's attention.

Our invention, evidently is susceptible of many modifications and we do not therefore desire to limit ourselves to precise details of construction.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a grounded circuit telephone line extending to the central station, of a normally closed connection therefrom through an operator's telephone to ground, a battery at the central station adapted to be connected in a ground branch from the metallic side of the line when connection is made at the central station, a self restoring clearing-out indicator in circuit with said battery, and means at the subscribers' station for opening and closing said battery circuit to actuate said indicator, substantially as described.

2. The combination with two grounded circuit telephone lines extending to the central station, of a normally closed connection from the line through an operator's telephone to ground, adapted to be disconnected from the line when connection is made at the central station a single strand cord connector adapted to connect the lines at the central station, a connection to ground through a battery from said cord strand, and a self restoring clearing out indicator at the central office adapted to be traversed by the current from said battery to display a visual signal, and a switch at each of the subscribers' stations adapted to open or close the circuit of said battery through the indicator, substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands and seals.

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Witnesses:

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