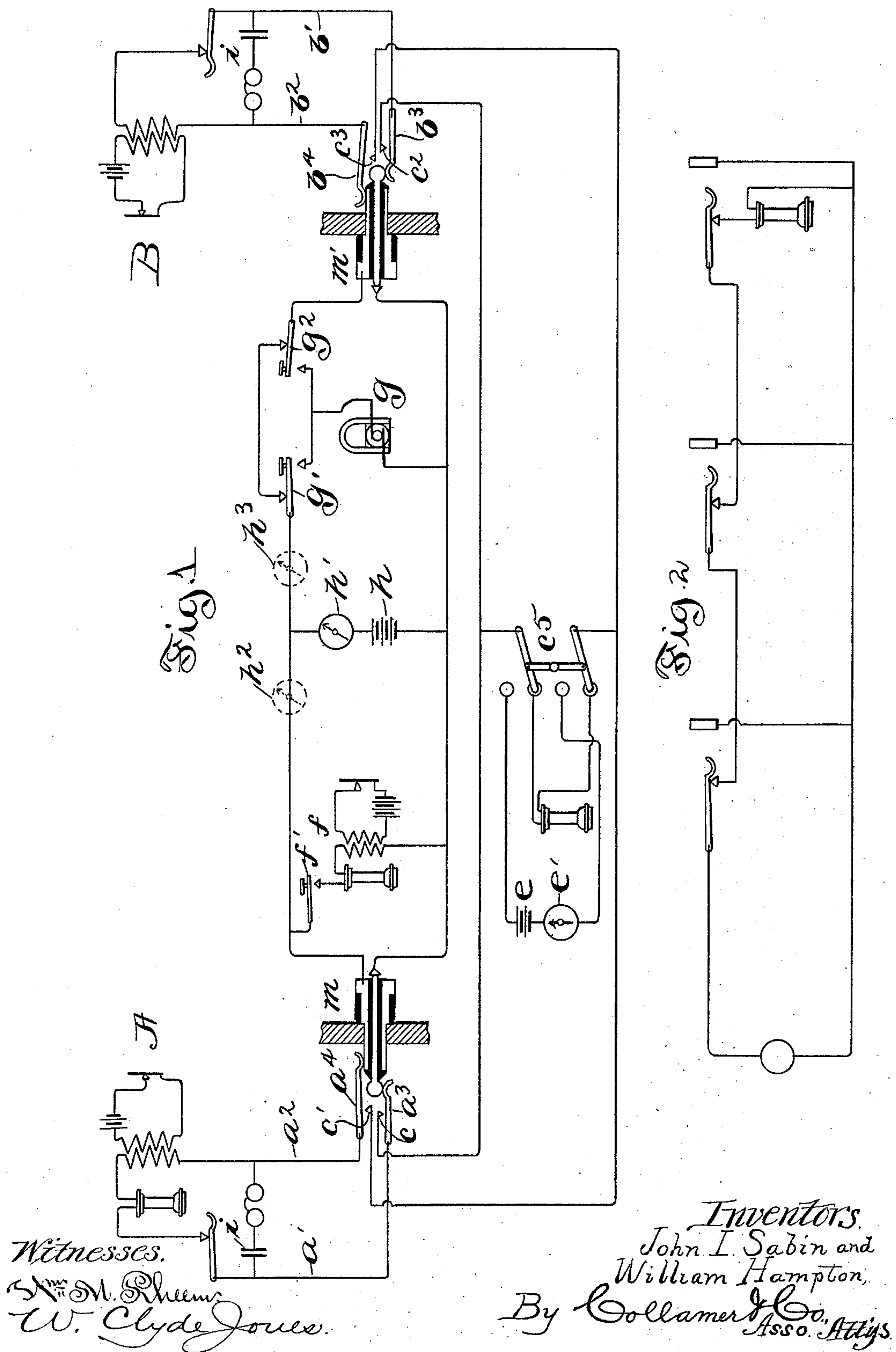


(No Model.)

J. I. SABIN & W. HAMPTON.
TELEPHONE EXCHANGE SYSTEM.

No. 518,334.

Patented Apr. 17, 1894.



UNITED STATES PATENT OFFICE.

JOHN I. SABIN AND WILLIAM HAMPTON, OF SAN FRANCISCO, CALIFORNIA.

TELEPHONE-EXCHANGE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 518,334, dated April 17, 1894.

Application filed April 13, 1893. Serial No. 470,229. (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 Systems for Operating Subscribers' Signaling and Clearing Indicators on Metallic Circuits, of which the following is a specification.

Our invention relates to telephone systems, and its object is to reduce and render more uniform the time required to secure connection and to provide means, whereby signals for disconnection and for calling may be transmitted to the central office with minimum exertion on behalf of the subscriber.

Our invention in its preferred embodiment comprises a metallic circuit telephone line extending to a switch at the central office, or in multiple systems to the switches upon the several boards. A pair of contact anvils are provided against which the line springs normally rest, the contact anvils being connected to a local circuit including the operator's cap telephone. A switch is provided at the subscriber's station, preferably operated by his telephone hook which is normally open, but which, when closed, connects the subscriber's telephone set in circuit with the operator's cap telephone.

It will be understood that in exchanges where a single operator cannot attend to all of the calls, each operator attends to a definite number of the subscribers of the exchange, both according to the multiple board system and the divided board system. The contact anvils belonging to the spring jacks of all such subscribers are connected through the operator's cap telephone, so that 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 the same time. The subscribers when in conversation are connected by a pair of plugs provided with two strands, a tip and a sleeve strand. The line springs normally in contact with the contact anvils are moved away from the same when the plug is inserted, the operator's cap telephone being thereby cut out of circuit. The operator's

listening-in telephone, when used, and the generator are adapted to be bridged between the cord strands. Between the strands is provided a bridge connection containing a battery, and an indicator is provided therein or a pair of indicators are provided in the strands upon opposite sides of said bridge to serve as clearing-out indicators.

We will describe our invention more in detail in connection with the accompanying drawings, in which—

Figure 1 illustrates two subscribers metallic circuits connected together for conversation. Fig. 2 shows a manner of connecting the operator's local circuit in a multiple board system connected according to the series switch plan.

In Fig. 1 we have illustrated the subscriber's line extending to a single board at the central office, it being understood that our invention may equally be applied to multiple boards, as illustrated in Fig. 2, or by extending the lines to switches in multiple at the other boards, in which case it would be preferable to extend the operator's local telephone circuit through the several spring jacks so that a connection at any board would serve to cut the indicator from circuit.

The limbs $a^1 a^2$ of the metallic circuit of subscriber A are connected with the line springs $a^3 a^4$. Likewise, the limbs $b^1 b^2$ of the metallic circuit of subscriber B are connected with the line springs $b^3 b^4$. The springs $a^3 a^4$ rest normally against contact anvils $c c'$, which are connected with the local metallic circuit containing the operator's cap telephone. Likewise the springs $b^3 b^4$ rest normally against contact anvils $c^2 c^3$, also connected through the operator's cap telephone. A switch c^5 is provided, by means of which the operator, when she desires to remove the cap telephone, may cut the same from the circuit, and include therein the battery e and the operator's individual indicator e' . When the battery and indicator are thus in circuit the subscriber, by removing his telephone from the hook, closes the battery circuit, and the indicator displays the visual signal, thus informing the operator that a connection is desired. She may then replace the cap telephone and receive the order. When in conversation the subscribers are connected by a

pair of plugs and a double stranded cord. The plugs, when inserted in the spring jacks, move the line springs away from their contact anvils, thereby cutting the cap telephone
 5 out of circuit. The operator's listening-in telephone set f is included in a bridge between the two strands of the cord, and a key f' is provided whereby the telephone may be bridged into circuit. The calling generator
 10 g is likewise included in a bridge between the strands, a pair of keys $g' g^2$ being provided whereby the calling currents may be sent through either plug. A battery h and an indicator h' are included in a bridge between
 15 the two strands of the cord connector. So long as the telephone at either subscriber's station remains off the hook the circuit of battery h is closed through indicator h' , but so soon as both hang up their telephones, the
 20 circuit of battery h is opened and the indicator being no longer energized, indicates a desire for disconnection. In order that the circuit through said battery may be open except when the telephone is off the hook, the
 25 bridge containing the bell may contain a condenser i . Instead of a single clearing-out indicator h' , a pair of indicators $h^2 h^3$ may be employed, as indicated in dotted lines, the indicator h^2 being controlled by subscriber
 30 A, while indicator h^3 is controlled by subscriber B.

It is evident that other forms of subscriber's station apparatus may be employed, the requisite being that the circuit remain closed at
 35 the subscriber's station while the subscriber is talking.

We will now describe briefly the several operations required to secure connection between two subscribers. Subscriber A, wishing
 40 to talk with subscriber B, removes his telephone and is immediately in circuit with the operator's cap telephone. The operator having received from the subscriber the number of subscriber B, inserts plug m' into the
 45 spring jack of subscriber B and bridges her listening-in telephone set between the cord strands. If B is busy through a connection at some other board, there will be a difference of potential between the line springs of
 50 the spring jack, and as the plug is inserted she will hear a click in her telephone. If subscriber B be not busy, the operator inserts plug m in the spring jack of subscriber A, and depresses ringing key g^2 to send a calling
 55 current to subscriber B. Subscriber B having responded, she cuts out her telephone set and the subscribers are in connection. When the conversation is completed, the sub-

scribers hang up their telephones, thus opening the circuits of the battery h through the
 60 indicator h' , when one is used, or through indicators $h^2 h^3$ when two are used.

This application is one of a series of currently pending applications Serial Nos. 464,509; 465,791; 490,950, and 499,954 and so
 65 far as anything shown herein is claimed in any of said applications, this application is to be considered subsidiary thereto.

Having described our invention, what we claim, and desire to secure by Letters Patent, 70 is—

1. The combination with a metallic circuit telephone line, extending to the central station, of a metallic local circuit containing the
 75 operator's cap telephone normally in circuit with said line, and means at the subscriber's station for closing his telephone set in circuit with said cap telephone, substantially as described.

2. The combination with a metallic circuit
 80 telephone line extending to the central station and normally open at the subscriber's station, of a metallic local circuit containing the operator's cap telephone normally in circuit with said line, and a switch at the sub-
 85 scriber's station adapted to be actuated by the removal of the telephone from its hook to close the subscriber's telephone set in circuit with said cap telephone, substantially as described. 90

3. The combination with two metallic circuit telephone lines extending to the central station and normally open at the subscriber's station, of a local metallic circuit containing
 95 an operator's cap telephone normally in circuit with the line of the calling subscriber, but cut therefrom by the act of making connection at the central station, means at the subscriber's station for closing his telephone
 100 set in circuit with said cap telephone, a double stranded cord connector looping the two telephone lines together at the central station, a clearing out indicator in circuit at the central station, a battery in a bridge between
 105 the two strands of the cord connector, and means at the subscribers' stations for maintaining said battery circuit open or closed to cause said clearing out indicator to display the desired signal, substantially as described.

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

JOHN I. SABIN. [L. S.]

WILLIAM HAMPTON. [L. S.]

Witnesses:

EDWARD E. OSBORN,

C. W. M. SMITH.