

No. 679,805.

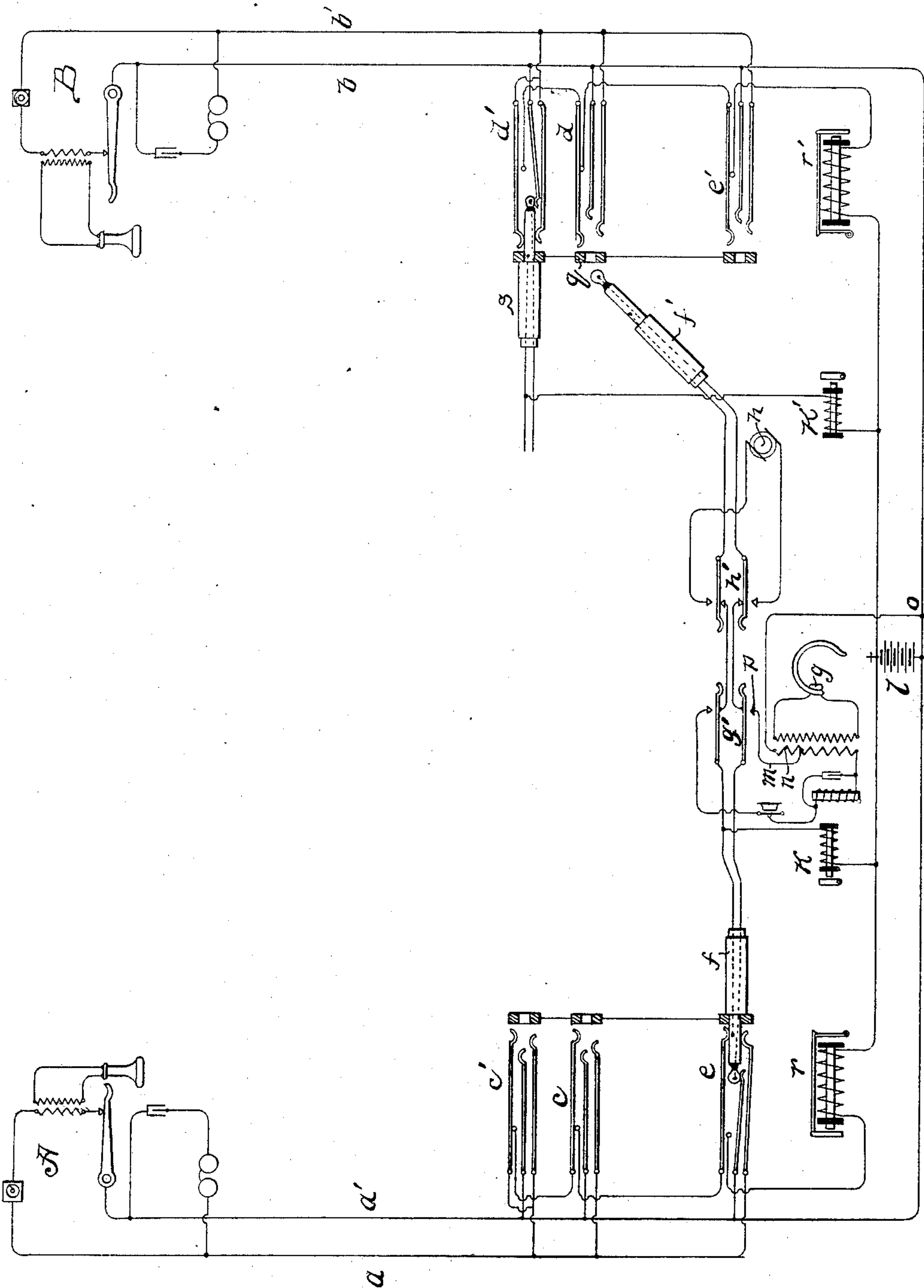
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H. G. WEBSTER.

TEST SYSTEM FOR MULTIPLE SWITCHBOARDS.

(Application filed Oct. 29, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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TEST SYSTEM FOR MULTIPLE SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 679,805, dated August 6, 1901.

Application filed October 29, 1900. Serial No. 34,771. (No model.)

To all whom it may concern:

Be it known that I, HARRY G. WEBSTER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Test Systems for Multiple Switchboards, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to a testing system for multiple switchboards, and its object is the provision of a system for giving an audible signal to the operator when the line called for is in use by diversion of a portion of the current of the main battery without the use of an auxiliary testing-circuit and battery. By means of my invention for making the test I am able to avoid complication of the circuits of the board and at the same time provide a reliable and effective test.

In carrying out my invention I provide means for diverting a portion of the current of the main battery for the purpose of testing and at the same time avoid the diversion of so large an amount of current that it will interfere with the operation of the system.

In this system the plug-tips are when inserted in the jacks all connected to one side of the battery, while the sleeves of the plugs are connected through the instruments included in circuit with the other side of the battery. When the answering-plug is inserted in the jack of the subscriber called and the listening-key is operated, the operator's telephone is bridged across the line.

In my invention I arrange a circuit in shunt of the bridge, including the operator's telephone, which is adapted to be closed by the answering-plug when a line called for is engaged at another board, and I provide in this shunt test-circuit resistance sufficient to allow a fraction of the current to flow enough to give the indicating-signal in the operator's telephone.

My invention I have illustrated in the accompanying drawing, and I will describe it in detail with reference to this drawing.

Two substations A and B are each equipped with the telephonic appliances and the signal-

bells usual in common battery systems and each connected through line-wires $a a' b b'$, respectively, with spring-jacks $c c' d d'$ upon different sections of the multiple switchboard at the exchange. The answering-jacks $e e'$ may be considered as appearing upon the sections with the spring-jacks $c d$. The double plugs $f f'$ are shown with their cord-circuits and the instruments included therein. In addition there is shown inserted in the spring-jack d' one plug of a pair at another section to illustrate the condition of the circuits when a line is in use.

I have illustrated diagrammatically the operator's telephone g and the generator h with the respective listening and ringing keys $g' h'$ all included in the cord-circuit. Connected also with one side of the cord-circuit is the clearing-out drop k , which is also connected with the positive side of the battery l . I have shown also the clearing-out drop k' with its connection to the cord-circuit of the second section. The clearing-out indicator k' , which may be assumed to be at the board where the plug s is located, is included in circuit with the subscriber's telephone-line, and the continuity of the circuit through the clearing-out drop is controlled by the gravity switch-hook at the subscriber's station, so that when the gravity switch-hook is relieved of the influence of the telephone-receiver the clearing-out indicator is placed in one condition of use, and when restored to its normal position by the receiver when it is replaced the clearing-out indicator is placed in another condition of use. I have not shown the complete cord-circuit of the second section, as this is unnecessary, the cord-circuits being identical at the different sections, and I have left out all unnecessary details, illustrating only, and that in a diagrammatic way, the essential features of my present invention.

Connected to the primary of the induction-coil of the operator's telephone at a point between its extremities or to another coil inductively associated with the secondary of the induction-coil is the circuit m , which is adapted to be connected to one side of the cord-circuit by the operation of the operator's listening-key. By this means there is con-

connected in the shunt-circuit around the battery the coil n , which is preferably a portion of the primary and is connected with the negative side of the battery at o and completes its circuit through the contact p and the operator's listening-key g' , the tip of the plug f' , the thimble q of the spring-jack d , the sleeve of the plug s , the clearing-out drop k' , and the positive side of the battery, thus giving an audible signal to the operator when the circuit wanted is in use at another board.

The resistance of this test-circuit is low and so related to the branch including the operator's telephone that a sufficient current will flow over the test-circuit to give the desired signal.

To indicate the method followed in the operation of my system, I will describe the operation as it is practiced in an exchange embodying this system of testing.

When the subscriber at one of the stations, as A, lifts his telephone from the hook, the circuit is completed through the lines to the central office through the battery l and through the subscriber's drop r , thus throwing the annunciator and indicating to the operator the fact that a subscriber has called for a connection. The operator inserts one plug of a pair in the answering-jack and with the tip of the other plug touches the thimble in front of the spring-jack of the subscriber called for, as d . This thimble is in a normally open circuit connected to similar thimbles associated with the spring-jacks of the same subscriber upon all the other boards. If the line is not in use, this test-circuit including the thimbles being open, no signal will be given to the operator. The plug will then be inserted into the spring-jack and the signal given to the subscriber called by means of the ringing-key h' . If, however, as indicated in the drawing, the subscriber called for shall be connected with another subscriber at a different board, the test-circuit including the thimbles will be connected with the sleeve of the plug and through the sleeve to the positive side of the battery. Then upon touching the tip of the plug to the thimble the circuit will be completed from the positive side of the battery through the clearing-out drop k' , the thimbles, the tip of the plug f' , and, the operator's listening-key being depressed, the circuit m , including the coil n , to the negative side of the battery. The resistance in this circuit is low enough so that some current will flow through coil n sufficient to give a positive signal to the operator, showing that the line called for is busy.

It will be seen that with my invention it is not necessary to use the lines running to the subscribers' stations to complete the testing-circuit, and no auxiliary battery or testing-circuit is required. It will be further apparent that I have provided a test system wherein the operator while testing may at the same time listen to the calling subscriber, this result being accomplished by reason of the fact

that the entire primary of the operator's transmitter is not included in a local circuit, but a special primary-coil portion that is preferably a part of the operator's complete primary coil that is employed for talking purposes, this special primary-coil portion being in inductive relation with the secondary of the operator's outfit.

While I have shown my system of testing as applied to the special form of multiple-switchboard system illustrated and described herein, it will be apparent to those skilled in the art that modifications in the system may be made and my invention still be employed. I do not wish, therefore, to limit myself in my application to the precise system shown and described nor to the exact details set forth herein; but,

Having thus described an embodiment of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a multiple-switchboard telephone-exchange system, the combination with a plurality of telephone-lines extending from subscribers' stations to an exchange, each telephone-line being connected at the exchange with jacks upon a number of sections of a multiple switchboard, cord-connecting apparatus for uniting subscribers for conversation including a testing-plug, connected thimbles for the jacks of each line, the said test-plugs being provided with tip and sleeve portions, the sleeve portions being adapted for connection with the test-thimbles when inserted, an operator's telephone appliance, a listening-key for connecting same with and disconnecting it from the cord-circuit, a coil portion n in inductive relation with the secondary of the operator's telephone appliance, a battery connected between one terminal of the said coil portion and the sleeve-strand, the remaining terminal of the coil portion being adapted for connection with the tip of the testing-plug upon the operation of the listening-key, and a second coil portion also in inductive relation with the secondary coil of the operator's telephone appliance adapted for inclusion in a subscriber's telephonic circuit, substantially as described.

2. In a multiple-switchboard telephone-exchange system, the combination with a plurality of telephone-lines extending from subscribers' stations to an exchange, each telephone-line being connected at the exchange with jacks upon a number of sections of a multiple switchboard, cord-connecting apparatus for uniting subscribers for conversation including a testing-plug, connected thimbles for the jacks of each line, the said test-plugs being provided with tip and sleeve portions, the sleeve portions being adapted for connection with the test-thimbles when inserted, an operator's telephone appliance, a listening-key for connecting same with and disconnecting it from the cord-circuit, a coil portion n in inductive relation with the secondary of the operator's telephone appliance, a

battery connected between one terminal of the said coil portion and the sleeve-strand, the remaining terminal of the coil portion being adapted for connection with the tip of the testing-plug upon the operation of the listening-key, a second coil portion also in inductive relation with the secondary coil of the operator's telephone appliance adapted for inclusion in a subscriber's telephonic circuit, and a clearing-out indicator included in circuit with the battery and the sleeve of the testing-plug, substantially as described.

3. In a multiple-switchboard telephone-exchange system, the combination with a plurality of telephone-lines extending from subscribers' stations to an exchange, each telephone-line being connected at the exchange with jacks upon a number of sections of a multiple switchboard, cord-connecting apparatus for uniting subscribers for conversation including a testing-plug, connected thimbles for the jacks of each line, the said test-plugs being provided with tip and sleeve portions, the sleeve portions being adapted for connection with the test-thimbles when inserted, an operator's telephone appliance including inductively-related primary and secondary coils, a listening-key for connecting the same with and disconnecting it from the cord-circuit, a battery interposed between the primary winding and the sleeve of said plug, and a conductor connected between the terminals of the primary winding and adapted for connection with the tip of the test-plug upon the operation of the listening-key, said listening-key serving to include the operator's telephone appliance in circuit with the subscriber's line, whereby a portion of the primary winding may be included in the test-circuit while the entire primary winding may

be included in circuit with a subscriber's line, substantially as described.

4. In a multiple-switchboard telephone-exchange system, the combination with a plurality of telephone-lines extending from subscribers' stations to an exchange, each telephone-line being connected at the exchange with jacks upon a number of sections of a multiple switchboard, cord-connecting apparatus for uniting subscribers for conversation including a testing-plug, connected thimbles for the jacks of each line, the said test-plugs being provided with tip and sleeve portions, the sleeve portions being adapted for connection with the test-thimbles when inserted, an operator's telephone appliance including inductively-related primary and secondary coils, a listening-key for connecting the same with and disconnecting it from the cord-circuit, a battery interposed between the primary winding and the sleeve of said plug, a conductor connected between the terminals of the primary winding and adapted for connection with the tip of the test-plug upon the operation of the listening-key, said listening-key serving to include the operator's telephone appliance in circuit with the subscriber's line, whereby a portion of the primary winding may be included in the test-circuit while the entire primary winding may be included in circuit with a subscriber's line, and a clearing-out indicator included in circuit with the battery and the sleeve of the testing-plug, substantially as described.

In witness whereof I hereunto subscribe my name this 27th day of October, A. D. 1900.

HARRY G. WEBSTER.

Witnesses:

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CHARLES E. HUBERD.