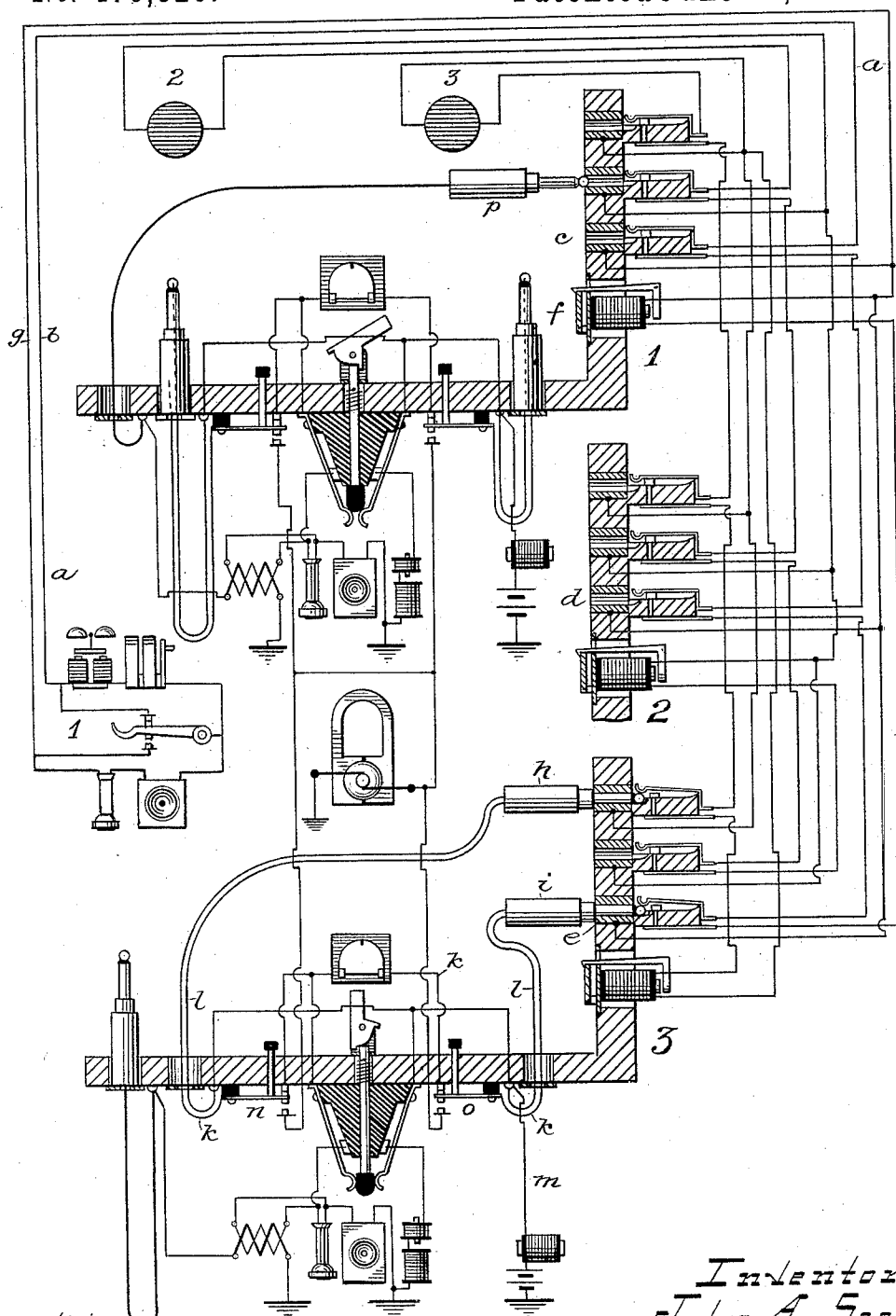


(No Model.)

J. A. SEELY.
TELEPHONE EXCHANGE APPARATUS.

No. 476,826.

Patented June 14, 1892.



Witnesses.

Charles G. Hawley,
Geo. R. Parker.

Inventor.
John A. Seely.
By George P. Barton.
Attorney.

UNITED STATES PATENT OFFICE.

JOHN A. SEELY, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE WESTERN
ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

TELEPHONE-EXCHANGE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 476,826, dated June 14, 1892.

Application filed November 25, 1889. Serial No. 331,495. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. SEELY, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Telephone-Exchange Apparatus, (Case No. 8,) 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 telephone-exchange apparatus; and its object is to provide ready means of sending current over metallic circuits when said metallic circuits are not provided with any ground connection at the subscribers' stations thereon.

My invention consists in metallic circuits each connected with two or more switchboards at the central office and loop-plugs and double-stranded cords at each of the switchboards, one of said strands being grounded, and a source of electric current and signal-keys so arranged that the operator at the central office may send current over any metallic-circuit telephone-line with which connection has been made by depressing the appropriate generator-key, thereby completing the circuit from ground through the generator to the strand of the cord extending to the tip of the loop-plug thereof, and thence over the metallic circuit and back to the strand of the cord connected with the sleeve of said plug, and thence to ground through the branch which contains the retardation-coil, this branch containing the retardation-coil being utilized for testing purposes, as heretofore.

My invention will be readily understood by reference to the accompanying drawing, in which I have shown three metallic-circuit subscribers' stations connected each with three different switchboards at the central office, together with an operator's outfit at each of two of said boards, the subscriber's outfit being shown in detail at one only of the stations. Telephone-line *a* extends in two branches or limbs from station 1 to the central office, one limb *b* being connected through the springs and contacts of each of the switches *c d e* of the different switchboards and through the individual annunciator *f* on the first board, while the other limb *g* of said circuit *a* is con-

nected with the test-pieces of each of said switches *c d e* and with the other side of said individual annunciator *f*.

The metallic circuits of stations 2 and 3 are provided with similar connections, thus when the telephone is on the switch at any station the generator of said station is in a metallic circuit, including the individual annunciator of the line at the central office.

At switchboard 3 I have shown the circuits of stations 3 and 1 looped together by a pair of loop-plugs *h i*, and the double-stranded cords connecting therewith. The strand *k* of said cords may be considered as connecting with the tips of the plugs and the strand *l* as connected with the sleeves thereof. The strand *l* is provided with a branch *m* through a retardation-coil and test-battery to ground, this battery being designed to throw current onto a line when a loop-plug is inserted in a switch thereof, so as to bring the line into electrical condition to indicate the busy test. In the other strand *k* of the cord I place ringing-keys *n o*, adapted to open the circuit of said strand and connect the generator therewith in either direction.

At board 1 I have shown the test-plug *p* applied to the switch of the line of subscriber's station 2, upon board 1, as in the act of testing said line. This is the ordinary test heretofore used and well understood.

I will now describe the manner of calling the central office and completing the connections at the central office between the calling-line and the line of the subscriber called for. Suppose subscriber at station 3 wishes connection with subscriber of station 1. I have not deemed it necessary to describe in detail the apparatus at station 3, since it is of the same construction as that shown at station 1, and when the telephone is on the switch the generator will be included in the circuit of station 3. The subscriber at station 3 will therefore turn his generator and operate his individual annunciator upon board 3 included in his metallic circuit. The operator will thereupon insert loop-plug *h* of her pair into the switch of the line of station 3, and bringing her telephone into circuit will learn what subscriber is wanted. In this instance it will be the line of station 1. This line *a* will be

tested first in the usual manner and then the plug *i* will be inserted therein, and then by means of signal-key *o* current will be sent over metallic circuit *a*, and this circuit may
 5 be traced from the ground through the generator at the central office to the said calling-key *o*, and thence over a strand of the cord to the tip of plug *i*, and thence over limb *b* of circuit *a*, through station 1, and back over
 10 the limb *g* to the sleeve of plug *i*, and thence to the strand connecting the sleeves of the plugs, this strand being connected with the grounded branch, including the retardation-coil, and thus the operator is enabled to signal
 15 the subscriber over a circuit formed by grounding one limb of his circuit through the generator and the other limb through the branch *m*. When the telephone at station 1 is on the telephone-switch, the bell will be included in circuit, and when key *o* is thus depressed the subscriber at station 1 will be notified of the call. In case the operator desires to signal station 3, she simply depresses
 20 key *n*, which thus brings the generator into a circuit which is completed through the
 25 strand *k* to the tip of plug *h* and thence over the metallic circuit of station 3 and back to the sleeve of plug *h*, and thence to ground through the branch containing the retardation-coil. When the subscriber is through
 30 talking, either by hanging up his telephone and turning his generator may signal to clear out.

Having thus described my invention, I
 35 claim as new and desire to secure by Letters Patent—

1. The combination, with a metallic circuit, including a subscriber's station and connected

with switches distributed on different switch-boards, of a loop-plug adapted to be inserted in one of the switches of said line, said loop-plug being provided with two strands, one of said strands being provided with a permanent ground connection through a retardation-coil and the other strand being provided with a key, and a source of electricity in a ground branch with which said key is adapted to be connected, substantially as and for the purpose specified.

2. Two telephone-lines looped together in a metallic circuit through the subscriber's station and a pair of loop-plugs and flexible cords for effecting this looping together, one of the strands of said cords being provided with a branch to ground through a retardation-coil and the other strand being provided with two calling-keys, in combination with a source of electricity in a ground branch with which said keys are adapted to be connected, whereby current may be sent over either of said telephone-lines through the subscriber's station by operating the appropriate key, the circuit thus formed in either case being from ground at the central office through the source of electricity to the key and thence to one
 65 strand of a cord and thence over the metallic circuit and back to the other strand of the cord and thence through the branch containing the retardation-coil to ground.

In witness whereof I hereunto subscribe my name this 15th day of November, A. D. 1889.

JOHN A. SEELY.

Witnesses:

J. MILTON FERRY,
 W. H. EARNST.