

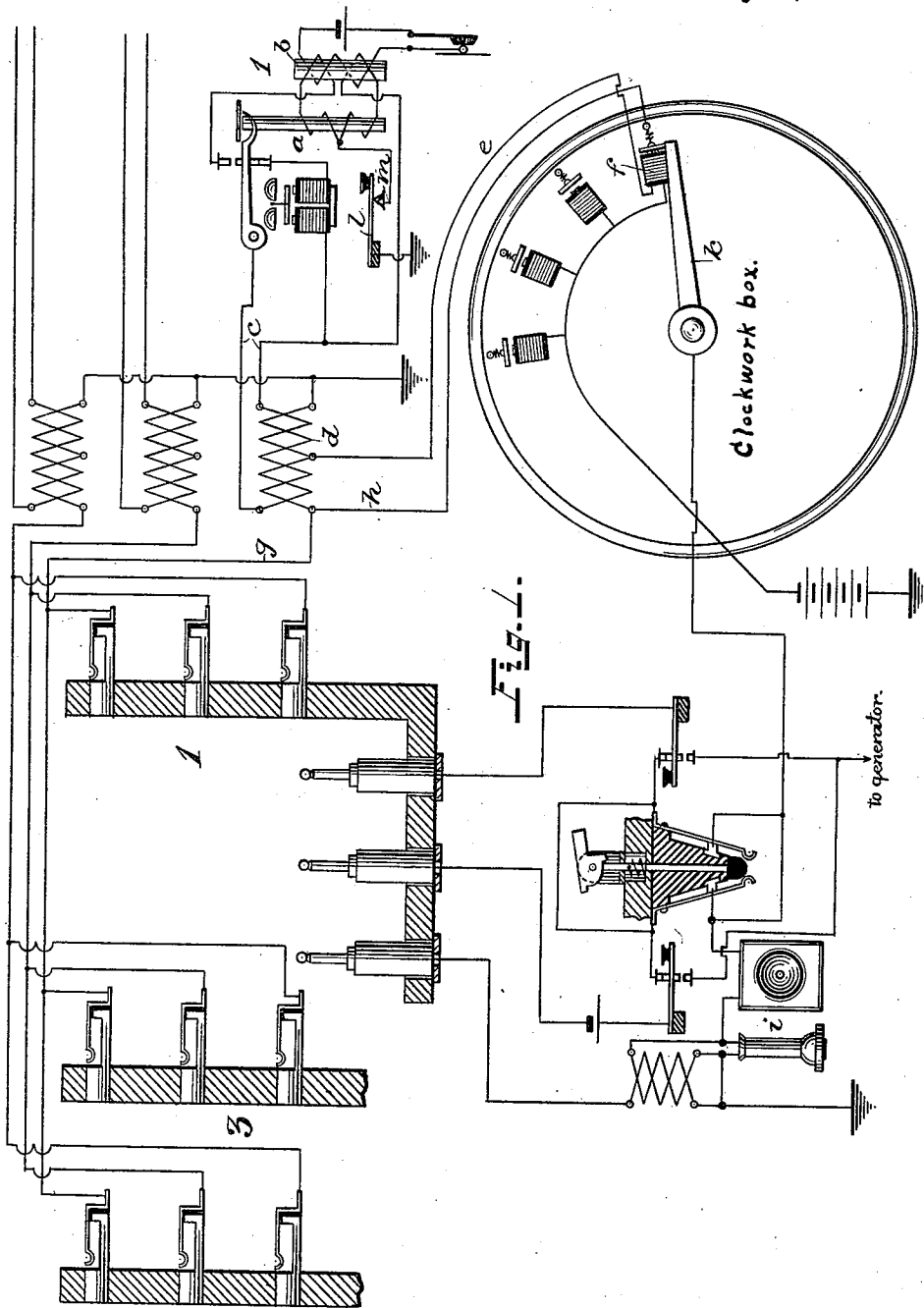
(No Model.)

2 Sheets—Sheet 1.

J. J. CARTY.
TELEPHONE EXCHANGE APPARATUS.

No. 427,156.

Patented May 6, 1890.



Witnesses.

C. Hawley.

G. R. Parker.

Inventor.

John J. Carty.

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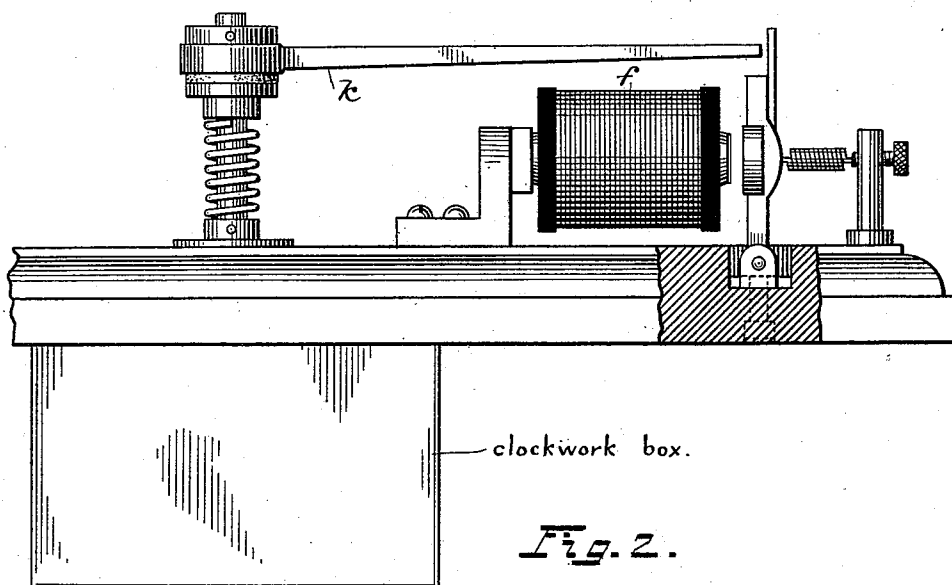
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UNITED STATES PATENT OFFICE.

JOHN J. CARTY, OF NEW YORK, N. Y., ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

TELEPHONE-EXCHANGE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 427,156, dated May 6, 1890.

Application filed October 26, 1889. Serial No. 328,290. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. CARTY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Telephone-Exchange Apparatus, (Case 9,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Heretofore in telephone-exchange systems means have been provided whereby any subscriber could bring his telephone into circuit with the telephone of a listening operator at the central office, so as to give his orders direct. This system has not been very generally used, one of its great objections being the confusion resulting when several impatient subscribers attempt to simultaneously give orders to the same listening operator. As shown in Reissue Letters Patent No. 10,989, granted William B. Vansize March 5, 1889, for telephone-exchange, it has been attempted to avoid this difficulty by providing a rotating arm at the central station adapted to make and break connection with the different conductors of the different subscribers successively and periodically, the circuits being so arranged that a subscriber may at the moment when connection is made with his line arrest the movement of the rotating arm, and thus bring his telephone into connection with the telephone of the listening-operator's line. All other telephone-lines will be disconnected therefrom.

The invention as described in said patent is adapted for use in connection with single or grounded circuit telephone-lines, and is not well adapted for use in connection with any of the metallic-circuit systems with which I am familiar.

The object of my invention is to provide means whereby the different subscribers may connect themselves one at a time with the listening operator, my invention being especially adapted for use in connection with metallic-circuit systems when used in multiple-switch-board systems or in systems employing single switch-boards.

My invention consists, first, in providing at

the central office in connection with each telephone-line a different relay, these relays being arranged so that when current is sent through any one of them its armature will be brought into the path of a moving circuit-closer, this circuit-closer serving to complete the connection with the operator's telephone; second, in providing at each station a differentially-wound telephone and a differentially-wound inductorium, the different sides of the metallic circuit including each a different portion or section of the differential windings, and one coil of a converter at the central office, a branch from said coil through the special relay of the line, and thence through a battery to ground, together with a key at the subscriber's station for completing a ground-circuit from the center of the differential winding of the telephone to ground; third, in a rotating arm driven by clock-work or other suitable means, and a series of relays with their armatures normally out of the path of said revolving arm, but in such relation thereto that when any armature is attracted it will be brought into the path of the arm to arrest the same and hold it in position until the armature is retracted, and, fourth, in a circuit containing the listening-operator's telephone connected with a revolving arm, said arm being adapted to be arrested by the armature of a relay to close contact with said armature, said armature being connected through a coil of a converter to ground, the other coil of said converter being included in a metallic-circuit telephone-line, whereby said telephone-line is connected telephonically with the circuit containing the listening-operator's telephone.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a diagram illustrative of three metallic-circuit telephone-lines, each being connected through the winding of a different converter at the central office, the other winding of each of said converters including a wire extending each to a different switch on three different switch-boards, together with the operator's outfit at one of the boards, the moving arm in connection with the relays of the different telephone-lines and the sub-

scriber's apparatus at one station in detail. Fig. 2 is a side elevation of a relay and the moving arm.

Referring now to Fig. 1, it will be seen that the telephone *a* at subscriber's station 1 is wound differentially. The different opposite windings of the telephone are extended to the inductorium *b* and wound about the same each oppositely. The telephone-line or metallic circuit *c* includes in different sides thereof these differential windings, and at the central office includes a winding of the converter *d*. A branch *e* from this coil of the converter extends through the coil of the relay *f*, and thence through a source of electricity to ground. The other coil of the converter is included in a circuit *g*, extending to a switch on each of the multiple switch-boards 1 2 3, and is normally open in this direction, the end of wire *g* on the other side of the converter being grounded. A branch *h* from the open side of wire *g* extends to the armature of relay *f*.

The operator's telephone *i* is included in a circuit connecting with the revolving arm *k*. This arm *k* is driven, preferably, by clock-work and preferably rotated, so as to pass near the armatures of the different relays one after another, without, however, coming in contact with any one of them except when an armature is actuated.

At the subscriber's station is provided a key *l*, adapted to close upon a contact *m* at the center of the differential winding of the telephone.

I have not deemed it necessary to describe in detail the manner of making the connections and disconnections between the telephone-lines upon the switch-board, since my invention relates more particularly to the instrumentalities whereby any subscriber is enabled to put himself into telephonic communication with the listening operator to the exclusion of all other subscribers.

We will suppose that the subscriber at station 1 wishes to communicate with the listening operator. He simply depresses key *l*, and, taking down his telephone, is brought into communication with the listening operator as soon as the moving arm shall come against the actuated armature of his relay. The circuit which is thus formed may be traced from ground at the subscriber's station over the two sides of the metallic circuit of the telephone-line *c* to the branch *e*, connected through the relay and thence through the battery to ground. The armature of the relay is thus brought into the path of the moving arm and the arm closes against the same, as shown. The arm is thus brought into electrical connection with the branch *e*, and the subscriber, still holding the key *l* depressed and his telephone being removed from the switch,

may communicate with the listening operator. The order having been received by the listening operator, he proceeds in the usual manner to make the connection with the line wanted. When the subscribers are through talking, the calling subscriber again depresses his key *l*, thus connecting himself again with the listening operator and telling him to disconnect.

My invention admits of various modifications which would readily suggest themselves to those familiar with electrical apparatus and mechanical devices, and I therefore do not limit myself to the details of construction shown.

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

1. A metallic circuit connecting a subscriber's station with the central office, a grounding-key at the subscriber's station, and a branch from said metallic circuit at the central office to ground, said branch including the coils of a relay and a source of electricity, in combination with a moving arm, whereby said arm is arrested when the relay is operated, substantially as and for the purpose specified.

2. A metallic-circuit telephone-line including one coil of a converter at the central office and in each of the different sides thereof a differentially-wound coil of the subscriber's telephone and the inductorium thereof, a branch connection to ground from between the two oppositely-wound or differential coils of the telephone, said branch containing a normally-open circuit-closer, in combination with a branch to ground at the central office, said branch being connected with the said coil of the converter included in said metallic circuit, and a battery and electro-magnetic circuit-closer included in said ground branch at the central office, substantially as and for the purpose specified.

3. The combination, with a rotating arm connected with an operator's telephone, of a series of contacts arranged about said arm, each of said contacts being controlled by a different electro-magnetic device, and each of said electro-magnetic devices being provided with an electric circuit extending to a different subscriber's station, and being there provided with a key for closing the same, whereby any subscriber may bring his circuit into connection with the operator's telephone, excluding all others from the same, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name this 5th day of October, A. D. 1889.

JOHN J. CARTY.

Witnesses:

C. G. HAWLEY,
ELLA EDLER.