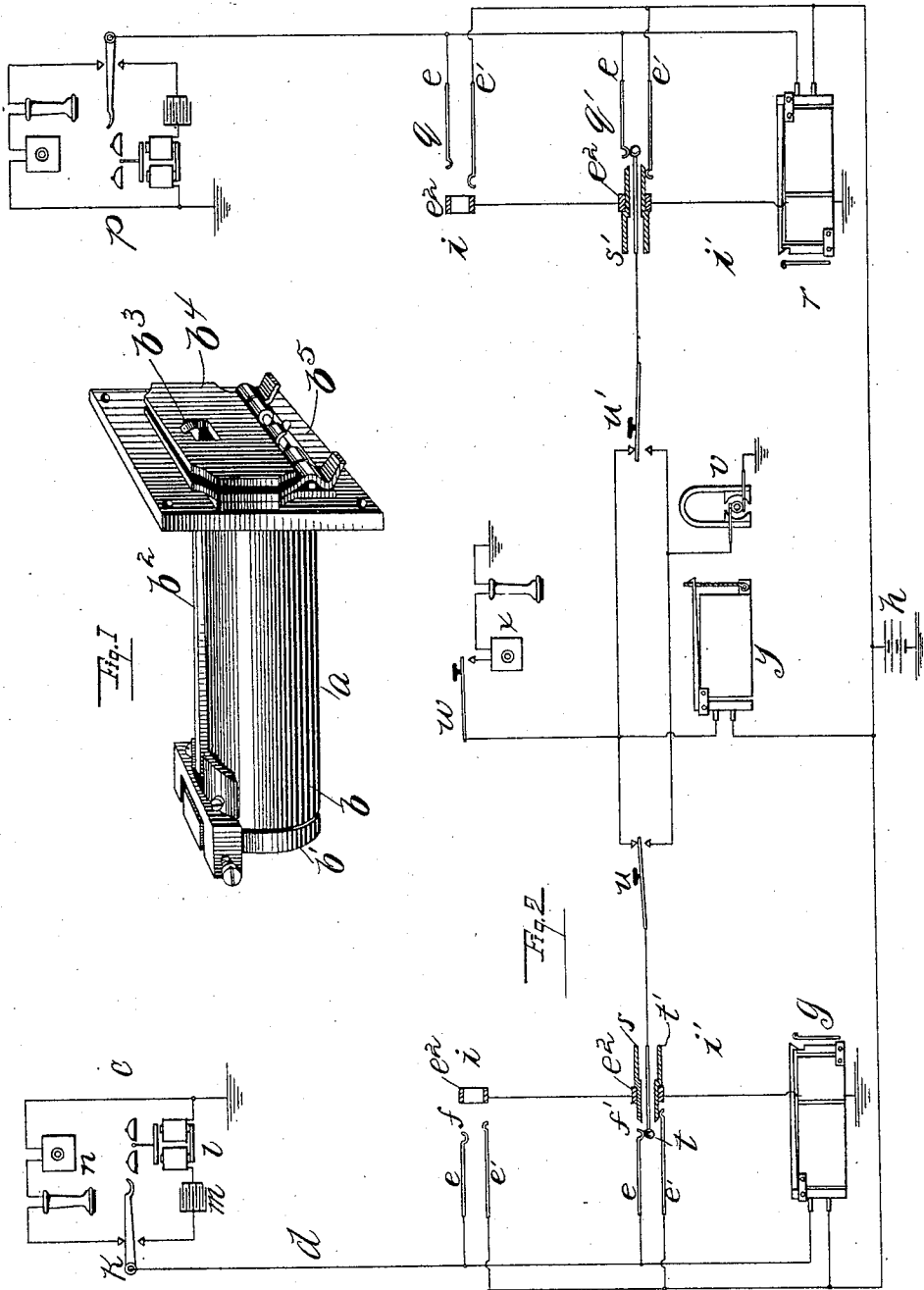


(No Model.)

C. E. SCRIBNER.
TELEPHONE EXCHANGE SYSTEM.

No. 574,221.

Patented Dec. 29, 1896.



WITNESSES:

George L. Cragg.
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INVENTOR:

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by Barton & Brown Att'y's

UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

TELEPHONE-EXCHANGE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 574,221, dated December 29, 1896.

Application filed June 6, 1894. Serial No. 513,720. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, 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 Telephone-Exchange Systems, (Case No. 357,) 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.

My invention relates to signaling apparatus of telephone-exchange systems. Its object is to transmit signals automatically from a substation to the central station of the system to notify the attendant at the central station that a connection is desired or to instruct her to break a connection already established, the transmission of the signals being controlled automatically in the use of the telephone.

As is well known, in the ordinary telephone-exchange system each substation is provided with a generator of signaling-current, and suitable annunciators are connected with each line therefrom at the central exchange, adapted to be operated by the generators of signaling-current. A subscriber requiring a connection from his line to some other line of the exchange attracts the attention of the operator at the exchange by rotating his generator and thus operating the individual annunciator connected with his line. When the desired connection is made with the line, another annunciator, known as the "clearing-out" annunciator, is connected therewith, while the first annunciator is disconnected or rendered inoperative. Having finished his conversation, the subscriber again rotates his signaling-generator, whereby the second-mentioned annunciator is operated, its signal being understood by the operator to indicate that the lines may be disconnected.

In my invention I have aimed to accomplish the different operations of signaling for connection and for disconnection automatically by means of sources of current located at the central exchange, whose connections through the necessary annunciators shall be closed or opened by the operation of the automatic switch-hook or telephone-support at the sub-

station. To this end I provide a common signaling-battery or source of electric current at the telephone-exchange, grounded at one pole and connected at its other pole through an individual annunciator with each line-wire of the exchange system, and at each substation I arrange switch-contacts controlled by the automatic telephone-switch, adapted to ground the line at the substation when the telephone is removed from the switch-hook and to disconnect it therefrom, as far as continuous currents are concerned, when the telephone is again replaced upon its switch-hook. I provide the usual clearing-out annunciator and means for connecting it with the line and for rendering the individual annunciator inoperative when connection is made with the line. The individual annunciator may be of ordinary character, adapted to display its indication when current finds circuit through it; but the clearing-out annunciator is of different type and is arranged to conceal its indication while current exists in its coil and to display the same when such current ceases. Thus when the telephone at a substation is removed from its switch-hook the corresponding line is grounded there, the circuit of the common signaling-battery is closed through the individual annunciator, and the latter gives its signal. Connection is then made with the line in the usual way, whereby the clearing-out annunciator is connected with it and the signaling-battery finds circuit through this annunciator also to earth at the substation, retaining the clearing-out annunciator, however, in position to conceal its indicator. When, the conversation having been finished, the telephone is again replaced upon the switch-hook at the substation, the circuit of the common battery through the clearing-out annunciator is interrupted and the latter gives its indication.

It is of course necessary to have some means by which the operator at the exchange may signal to the substation, so that some form of return-circuit from the substation is required. I prefer to employ for this purpose a normally-closed ground branch from the line at the substation, including a proper signaling instrument, as a polarized bell, together with

a condenser, a coil of high resistance, or other well-known means for preventing sufficient flow of battery through the line to earth at the substation to operate the annunciator.

- 5 When the condenser mentioned is employed, the operator at the exchange may be provided with a generator of signaling-current of alternating character, which will find free passage through the condenser and will thus
10 operate the polarized bell.

My invention is illustrated in the accompanying drawings.

- Figure 1 of the drawings represents in perspective view the special clearing-out annunciator which I employ. Fig. 2 is a diagram
15 of the circuits which constitute my invention.

- Referring to Fig. 1, the clearing-out annunciator *a* is seen to comprise the usual tubular magnet *b*, having a pivoted armature *b'*, carrying an arm *b²*, provided at its extremity with a catch *b³*, engaging a shutter *b⁴*. This shutter is pivoted at its lower edge to one side of its center of gravity, so that when released it falls outward and displays a number of
20 other indications upon the face-plate *b⁵*. The catch *b³* is adapted to engage the shutter *b⁴* only when the armature *b'* is attracted, this being the position in which the annunciator is shown in the drawings. When the armature is unattracted, the catch falls and permits the shutter to fall outward.

- In Fig. 2 two substations are represented, each connected by a line-wire with two spring-jacks and with an annunciator upon a switchboard at a telephone-exchange. Thus the station *c* is provided with a line-wire *d*, which is connected with a spring-contact *e* of each of two spring-jacks *f* and *f'* and with one terminal of an ordinary self-restoring annunciator *g*. The other terminal of annunciator *g* is connected through the common signaling-battery *h* to earth. The spring-jacks *f* and *f'* are assumed to be located upon two different sections *i* and *i'* of a multiple switchboard,
45 the individual annunciator *g* being upon the section *i'*. At the substation the line-wire *d* connects with the lever of a switch-hook *k*, one of whose switch-contacts is connected through a polarized bell *l* and a condenser *m*
50 to ground, and the other of whose contacts is connected through a telephone set *n* to ground. Each spring-jack, in addition to the line-contact *e*, has a spring *e'* and a thimble *e²*, which form the normally-separated terminals of a local circuit including the restoring or resetting magnet of the individual annunciator *g*, together with local battery *h*. The station *p* is provided with similar apparatus and is likewise connected with spring-jacks *q* and *q'* and with an annunciator *r*
60 upon the switchboards *i* and *i'* at the exchange.

- The operator at the switchboard has a number of connecting-plugs *s* and *s'*. Each of these plugs comprises a central stem *t*, terminating in a spherical tip adapted to make connection with line-spring *e* of a spring-

jack into which the plug may be inserted, and a sleeve *t'*, which is formed to cross together the local spring *e'* and the thimble *e²* of the spring-jack. The tips *t* of two plugs are connected together to form a pair, calling-keys *u* and *u'* being included in the conductor uniting them. These calling-keys are arranged with normal resting-contacts which
75 are connected together, and with alternate contacts which are connected with one terminal of a generator *v* of signaling-current so that by depressing either key the tip of the corresponding plug is connected with
80 the generator. A permanent connection is extended to the lever of listening-key *w*, whose switch-contact constitutes one terminal of the operator's telephone set *x*. A clearing-out annunciator *y*, of the kind shown in
85 Fig. 1, is permanently connected in a branch from the conductor uniting the plugs to the common battery *h*. The magnet of the clearing-out annunciator is constructed to have sufficient self-induction to prevent the shunting
90 of telephonic current to earth through its coil.

The operation of my invention will be readily understood from an inspection of the drawings. In the normal condition of the apparatus at the substation the circuit of battery *h* to ground at the substation is practically open at the condenser *m*, the telephone being ordinarily upon the switch-hook. When the telephone is removed from the switch-hook by
100 the subscriber, the circuit is immediately closed from the line through the telephone set *n*, whereby the annunciator *g* is caused to release its shutter. The operator at switchboard *i'*, seeing this indication, inserts a plug
105 *s* into the corresponding spring-jack *f'* upon her switchboard, at the same time depressing listening-key *w*. Her telephone *x* is thus connected with the telephone *n* at substation *c*, and the subscriber is enabled to communicate the order for the desired connection.
110 When the plug *s* was inserted into the jack, the spring *e'* and the thimble *e²* of the jack were crossed together through the sleeve *t'* of the plug, thus closing the local circuit of battery *h* and resetting the indicator of annunciator *g*. At the same time circuit was completed from battery *h*, through clearing-out
115 annunciator *y*, to the line *d* and thence to earth at the substation, whereby the clearing-out annunciator was placed in position to conceal its indication.

Having received the order for connection, the operator tests the line called for, for example, that to station *p*, in the usual way,
125 that is, by applying the tip of plug *s'* to the thimble *e²* of the spring-jack *q'* of that line to determine whether this thimble is connected with battery *h*. Having found the line free, the operator inserts the plug *s'* fully into
130 the spring-jack *q'*, thereby connecting the lines *d²* and *p'* together into a continuous circuit. She then depresses the corresponding calling-key, looping generator *v* into circuit,

the alternating current of this generator finding a free path to earth through the polarized bell *l* and the condenser *m* at station *p*.

When the subscribers, having finished their conversation, replace their telephones upon the switch-hooks, the circuit from battery *h* through the clearing-out annunciator *y* to earth at the substations is interrupted, and the annunciator permits its shutter to fall, thus indicating to the operator that the lines may be disconnected.

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

1. The combination with a telephone-line normally open at a substation, provided with a switch adapted to close a circuit through a telephone there, of an annunciator together with a source of current in the line-circuit at a central station, a connecting-plug for making connection with the line, a magnet-coil separate from the main coil on the said annunciator adapted to reset and retain the indicator thereof, the normally open local-circuit connections distinct from the line-circuit including the said magnet-coil adapted to be closed when the said connecting-plug is inserted into a line spring-jack, a clearing-out annunciator adapted to display its indi-

cator upon the cessation of current through it, and circuit connections completed with the said line when connection is made therewith including said clearing-out annunciator, substantially as described.

2. The combination with a telephone-line normally open as to continuous currents at its substation, having a switch adapted to close the circuit during the use of the telephone, of an annunciator together with a source of current permanently connected with the line at a central station, an electromagnet adapted when excited to conceal the indicator of the line-annunciator, a normally open local circuit including the said electromagnet, a clearing-out annunciator adapted to display its signal upon the cessation of current in it, and means for making connection with the line and simultaneously connecting therewith the said clearing-out annunciator and closing the said local circuit, substantially as described.

In witness whereof I hereunto subscribe my name this 14th day of May, A. D. 1894.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE L. CRAGG,
W. CLYDE JONES.