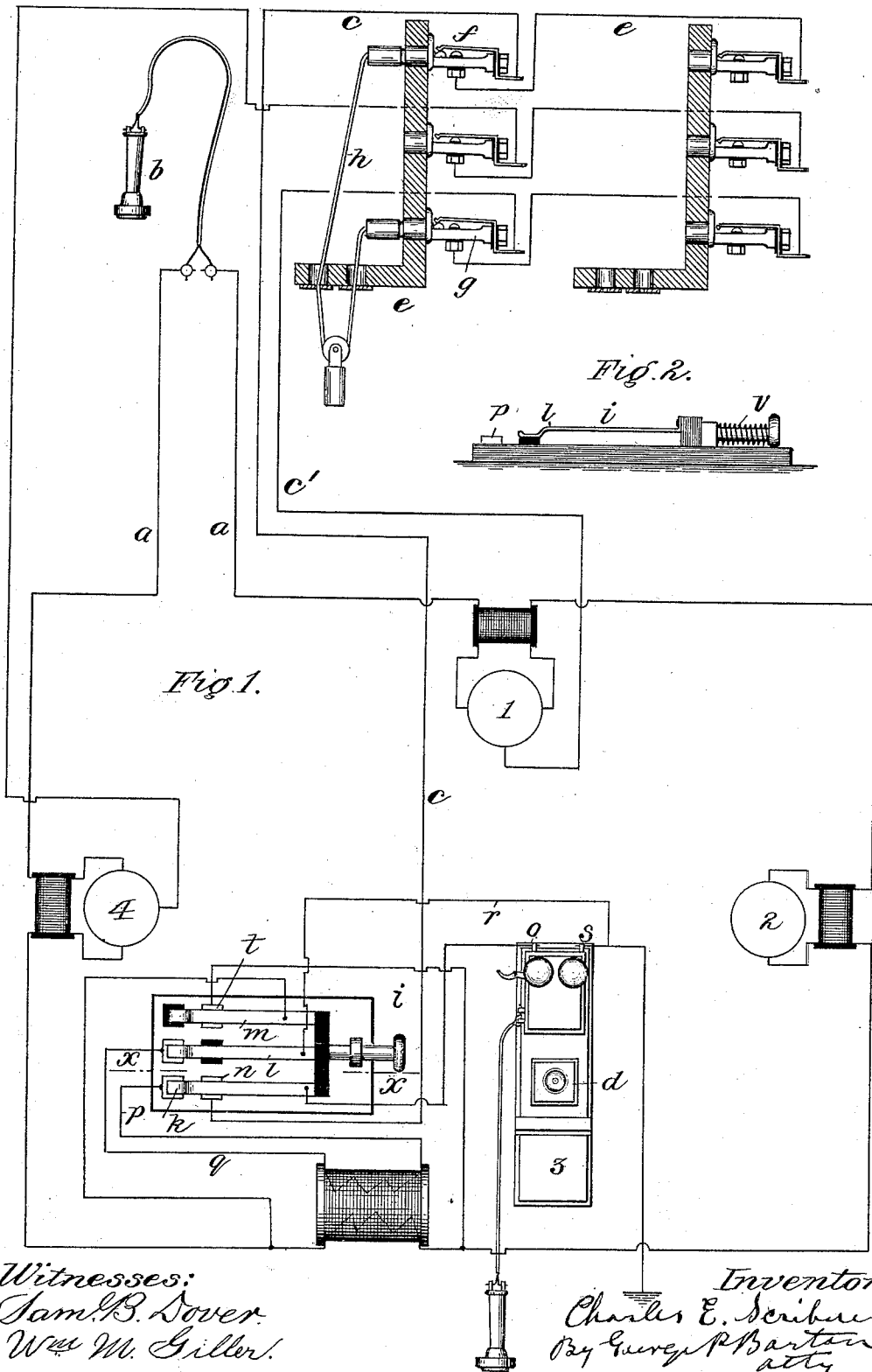


(No Model.)

C. E. SCRIBNER.
TELEPHONE EXCHANGE SYSTEM.

No. 415,573.

Patented Nov. 19, 1889.



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. 415,573, dated November 19, 1889.

Application filed June 13, 1887. Serial No. 241,149. (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 138,) 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 telephone-exchange systems, and more especially to that system in which the signals from the different stations are sent in over a common line to a listening operator at the central office, who has a telephone in the circuit of that common line.

My invention relates more particularly to the apparatus at the subscriber's station; and its object is to enable a subscriber to connect his individual telephone into the general circuit to speak to the operator at the central office or to connect his telephone into his own individual line, over which he converses with other subscribers. Heretofore this has been accomplished by means of a switch which broke into the signal-circuit to loop the subscriber's telephone therein. This system of breaking into the circuit is objectionable, since at each subscriber's station contact-points must be employed, which, if they should fail to operate properly at any one point, would disorganize the whole system.

My invention consists in providing at each of the different subscribers' stations an induction-coil, one winding of the coil being included in the signaling-circuit and the other coil being included in the circuit of a switch by means of which the telephone may be included in a local circuit with said winding. By this arrangement I avoid the liability of disorganizing the system by trouble at one station, since the only effect of failure of the apparatus to work properly at one station would be to leave open the circuit of one winding of the induction-coil, this winding being the one connected with the switch. The signaling-circuit will thus always remain integral. I preferably provide for shunting out the resistance of that winding of the coil which is in the general circuit an extra con-

tact upon the switch, this being sufficient to do the work. This point, should it fail to operate, merely leaves a little more resistance in the circuit, but does not render it inoperative.

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

Figure 1 represents four stations connected with the central office. Fig. 2 is a detail view upon line *x x* of Fig. 1 of the loop switch or commutator used at each of the stations.

At station 3 of Fig. 1 I have shown the telephone call-box and loop-switch with the circuit-connections in detail. The signaling-circuit *a* may be a metallic circuit extending from the listening operator's telephone *b* through each of the stations 1 2 3 4 and back to the telephone at the central station. From each of these stations an individual line *c* extends to the central station, where it is connected with its connecting-bolt or spring-jack.

The subscriber at station 3, wishing a connection, takes down his telephone, as shown, and at once speaks into his transmitter *d*, thus communicating with the listening operator at telephone *b*. The listening operator ascertains whether the line called for is busy in any of the well-known ways, and if he finds that it is free he proceeds to connect the line *c* of the calling subscriber with the line wanted. Thus, as shown at switch-board *e*, spring-jack *f* of line *c* is shown connected with spring-jack *g* of line *c'* by the flexible cord *h*, provided with terminal plugs.

At the central office I have shown two sections of a multiple switch-board. The connecting apparatus I have not shown in detail, since it is well known, and therefore needs no description.

The subscriber's loop-switch *i* may be of any form capable of doing the work. I have for clearness shown a switch having three spring-fingers *klm* attached to a rubber strip. A key-knob is mounted upon the spring, and by means of this knob the spring-fingers are pushed in or drawn out to make the necessary connections. This will be understood by reference to Fig. 2. Contact-points corresponding to said spring-fingers are provided upon a base. The spring-fingers are mounted upon

the same base and arranged to be moved back and forth to connect with or be separated from the contact-points to make the necessary changes of circuit. The switch being pushed in and the telephone removed from the hook, as shown at station 3, the circuit-connections will permit subscriber 3 to speak to the listening operator at telephone *b* over the circuit-wire *a*. Thus the circuit may be traced from telephone binding-post *o* to spring-finger *k*, and thence by wire *p* through the winding of the induction-coil, thence by wire *q* to spring-finger *l*, and thence by wire *r* to the other telephone binding-post *s*. The subscriber thus speaking into the transmitter *d* causes undulatory voice-currents to be sent through the local short circuit, which includes a winding of the induction-coil as before traced. The spring-finger *m*, having been pushed in simultaneously with the springs *k* *l*, is moved from its contact-point *t*, and thus the normal shunt around the induction-coil is opened. The voice-current, therefore, sent through the winding of the induction-coil included in the local circuit will induce corresponding currents in the signaling-circuit *a*, which is connected directly through the other winding of the induction-coil at said station 3. The subscriber, having communicated with the listening operator and obtained the service required, moves the loop-switch back to the position shown in Fig. 2. The shunt is thereupon closed between spring-finger *m* and point *t* around the signaling-circuit winding of the induction-coil. Spring-finger *l* is disconnected from its connection with wire *q* and spring-finger *k* from its connection with wire *p*, while a new connection is formed between spring-finger *k* and its normal contact-point *n*. The local circuit through the subscriber's winding of the induction-coil is thus opened and the circuit of the subscriber's individual line *c* may be traced, beginning at ground at station 3, thence to post *s*, and thence through the telephone in the usual manner to post *o*, thence to spring-finger *k* and contact *n*, and thence over wire *c* to the spring-jack *f* at the central office. Spring-jack *f* being connected with the spring-jack *g*, the circuit may be further traced from spring-jack *f* through cord *h* to spring-jack *g*, and thence by wire *c'* to subscriber's station 1, and through his telephone apparatus, in the usual manner, to ground, as before described with respect to station 3.

When the subscribers are through talking, one or the other switches back to the signaling-circuit and signals off—that is, tells the listening operator that he may disconnect.

In Fig. 2 I have shown a spring *v*, which normally holds the switch in position to close the circuit of the shunt between contact *t* and spring-finger *m*. When the spring *v* is used, the subscriber while talking constantly

presses the button in to bring the switch to the position shown at station 3, Fig. 1. On removing his finger from the button the resiliency of spring *v* causes the switch to assume the position shown in Fig. 2.

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

1. The combination, in a telephone-exchange system, with the signaling-circuit including several stations and a telephone permanently connected in the signaling-circuit at the central office, of individual telephone-lines radiating to the different stations and an induction-coil and switching apparatus at each station, whereby any subscriber may connect his telephone into a local circuit including one of the windings of the induction-coil, the other winding of the induction-coil being included in the signaling-circuit.

2. In a telephone-exchange system, the signaling-circuit extending from the central office to several subscribers' stations, individual telephone-lines extending from the central office to the several subscribers' stations, one line to each station, telephone apparatus and switching devices, and an induction-coil having one winding included in the circuit of the signaling-wire, the other winding connected in a local circuit through the subscriber's telephone, substantially as described.

3. The combination, at a subscriber's station, of an induction-coil with a signal-circuit including one of the windings of said coil and a shunt-circuit around said winding, a local circuit including the subscriber's telephone and the other winding of the induction-coil, and switching apparatus connected to open the said shunt-circuit at the same time the said switching apparatus closes the local circuit, whereby the subscriber's telephone may be connected with the signaling-circuit or disconnected therefrom, as described.

4. The combination, with an induction-coil, of a signaling-circuit including one winding of the said coil, a shunt-circuit around said winding, said shunt-circuit including a switching device, a telephone included in the circuit of the other winding of the induction-coil, a switching device included in the circuit of said telephone and winding, the two switching devices being connected to operate at the same time, whereby the shunt-circuit is automatically closed when the telephone-circuit is interrupted, and whereby the shunt-circuit is interrupted when the telephone-circuit is closed.

In witness whereof I hereunto subscribe my name this 1st day of June, A. D. 1887.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,
C. C. WOODWORTH.