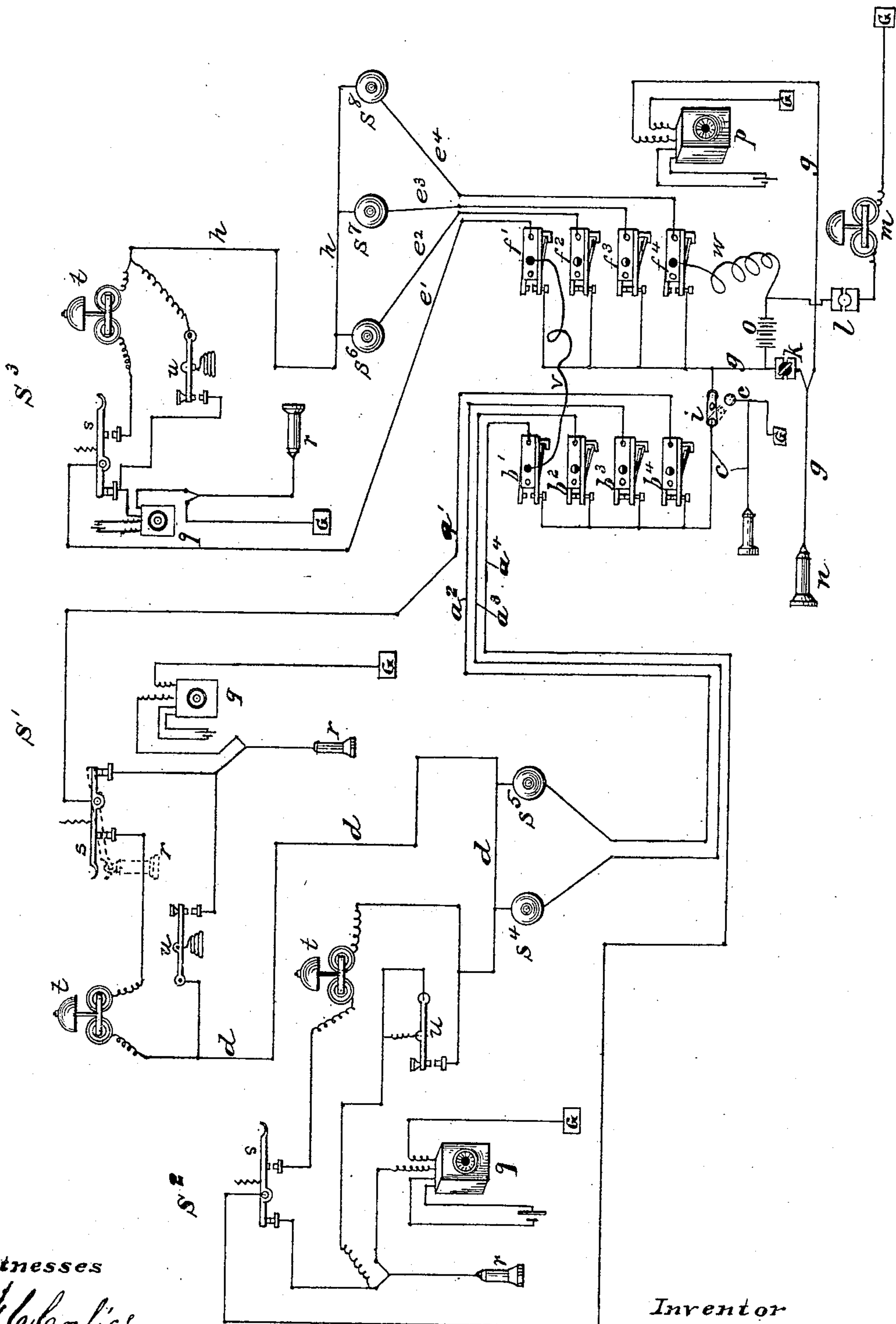


(No Model.)

C. E. SCRIBNER.
TELEPHONE EXCHANGE SYSTEM.

No. 266,321.

Patented Oct. 24, 1882.



Witnesses

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

TELEPHONE-EXCHANGE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 266,321, dated October 24, 1882.

Application filed March 22, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, of Chicago, Illinois, have discovered certain new and useful Improvements in Grouping Telephone-Exchange Circuits, 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.

10 The object of my invention is to provide for each subscriber a means of communication directly with the listening attendant at the central office at all times, for the purpose of obtaining a connection or disconnection, to enable the central-office manager to regulate at
15 will the number of subscribers to be taken care of by a single attendant, and an improved method of notifying the attendant of a call when he is not listening at his telephone.

20 Heretofore a given subscriber has signaled the central office over his individual telephone-line, or by means of a separate circuit-wire running from the central office to all of the subscribers. The objection to these systems is
25 that if the circuit-wire be broken none of the subscribers on that particular circuit can communicate their wants to the central office, nor can they obtain any service from the system until the damage is repaired. Another objection is that the central office has no means of
30 varying the number of subscribers taken care of by a single attendant, and thus regulating the service at the central office so as to correspond to the demands of business at different
35 hours of the day, which is necessary in case there are more calls from a group of subscribers than one attendant can take care of.

My invention consists in grouping the subscribers' wires at the central office to a common wire, which connects to a listening operator's telephone, and thence to ground, as hereinafter shown; in connecting the terminals of
40 subscribers' individual wires through call-bells at subscribers' offices, and thence to a common wire, said wire serving to group the outer ends of the telephone-lines together.

In the drawing two groups of subscribers are shown connected with the central office. The outfits of three subscribers, S^1 , S^2 , and S^3 ,
50 are shown in detail. The outfits of the other

subscribers, S^4 , S^5 , S^6 , S^7 , and S^8 , are simply indicated. The first four subscribers' lines, a^1 , a^2 , a^3 , and a^4 , are in one group and connected with jack-knife switches b^1 , b^2 , b^3 , b^4 , and to the common wire c of the listening operator's telephone at the central office, while their outer ends are connected by wire d . The second group of telephone-lines, e^1 , e^2 , e^3 , and e^4 , are connected in like manner through jack-knife switches f^1 , f^2 , f^3 , and f^4 to common wire g of the listening operator's telephone, and their outer ends are connected together by wire h . 55

It will be seen that by means of the switch i the two groups may be united and separated as occasion may require, and in like manner
65 any number of groups of wires may be combined or divided, so that the service at the central office may be adjusted at different hours of the day and at different seasons, in accordance with the demands of the subscribers. 70

k and l are peg-switches, and m is an annunciator or bell in a line connecting with line g through a battery.

When there are very few demands on the central office the attendant may change the
75 peg from switch k to switch l and take telephone n from his ear. Now, when any subscriber of the group takes down his telephone the circuit will be closed to ground through the battery and annunciator m , and the listening operator will change the peg back to switch
80 k and answer the call.

An automatic switch operated by the weight of the operator's telephone may be used instead of the peg-switches k and l . 85

The battery o is used primarily for calling up the subscribers asked for, but may be also used, as above indicated, to notify the listening operator that a subscriber has taken down his telephone. p is the listening operator's transmitter. 90

Each subscriber's outfit consists of a transmitter, q , receiving-telephone r , telephone-switch s , call-bell t , and open-circuit contact or push-key u . 95

When the telephone-switch is brought by the weight of the telephone to position indicated by dotted lines, (see outfit of S^1), the circuit of telephone-line a^1 may be traced from the lever of switch s directly through the call-bell 100

t to wire *d*. On removing the telephone *r* from the hook the telephone-line *a'* is changed, and may be traced from the switch-lever *s* through the receiving-telephone *r* and transmitter *q* to ground. One point of the push-key *u* is connected with the common line *d*, the other point with the line by which the circuit of the line *a'* is completed from the switch to the receiver. Ordinarily a subscriber has simply to take down his receiver and speak directly to the listening operator. Thus *S'* is connected directly with telephone *n* at the central office. Suppose, however, that the line *a'* were open at the central office. *S'*, by pressing on push-key *u*, would immediately connect his telephone and transmitter with the listening operator by a circuit passing from the common line over the individual telephone-lines *a²* and *a³* of the group, or so many of the group, whether one or a hundred, as might happen to be connected at the time with the common line *d*. Any subscriber may thus talk directly to the listening operator over a circuit consisting of many telephone-lines, connected at their outer ends with a common wire and at the central office with the common line of the listening operator. Each subscriber is thus provided with two circuits: first, his individual telephone-line; second, the lines of his group that happen to be connected with the common line at their outer ends when he connects with the said common line.

S² and *S³* are shown in private communication, connected through the central office by their telephone-lines *a⁴* and *e'* and the flexible cord *v*, which, with the plugs, connects their respective switches *b'* and *f'*. The central office calls the subscriber asked for by inserting a plug connected with the calling-battery in his switch. Switch *f⁴* is shown thus connected by flexible cord *w* with the calling-battery *o*. The line *e⁴* is thus cut off from the common ground-line *g*, and the circuit of the battery *o* may be traced from one pole by flexible cord *w* to switch *f⁴*, and by line *e⁴* through the call-bell of *S³*, (the telephone of *S³* is supposed to be hung on the switch, in the manner indicated by dotted lines, at station of *S'*), and thence to common line *h*, and by lines *e²* and *e³* of the group, or such lines as happen to be connected with line *h*, whether few or many, back to the central office to line *g*, to which the other pole of the battery is connected.

In practice there will be many lines in the return-circuit, so that the current dividing through the call-bells of the return-wires will not be sufficient to ring the bell of a given line. As the current passes in one direction through the bell of the subscriber called and in the opposite direction through the bells of the wires of the return-circuit, the bells may be polarized to respond only to the current passing out from the central office, and thus the possibility of false signals being induced by the return-current may be effectually prevented, even though there might be but a single wire of the group in the return-circuit. When the subscribers are through talking, either one may close his

push-key, and thus connect his outfit with the listening operator through the wires of his group that are at the time connected with the common wire of that group; or one subscriber may wait till the other hangs up his telephone, and then talk to the listening operator by a circuit composed of the two connected telephone-lines and the other wires of the group of the subscriber who has hung up his telephone. Suppose *S³* has hung up his telephone so as to change his switch to the position indicated by dotted lines at station of *S'*. *S²* may then talk to the listening operator at telephone *n* by the following circuit: beginning at ground, as indicated by *G*, at station of *S²*, and thence, as shown, through the transmitter and telephone to the telephone-switch, and thence by telephone-line *a¹* to switch *b'*, and thence to switch *f'*, and by line *e'* to the switch of *S³*, and thence through the call-bell of *S³* to common line *h*, and thence through the call-bells of *S⁶* *S⁷*, &c., and their lines *e²* *e³*, &c., to the common line *g*, which passes through the listening operator's telephone *n* and his transmitter *p* to ground, as shown. By this latter method the system may be worked successfully without the push-keys.

It will be seen two subscribers of the same group may be connected in the same manner, and that the number of subscribers in a group may be varied in accordance with the demands of business. A subscriber at all times has two chances of getting the central office. He has his individual line, which he will ordinarily use in the first instance; but if this line is not connected with the listening operator, by closing his push-key he has another circuit at his command.

I claim as my invention and desire to secure by Letters Patent—

1. The combination of telephone-line *a'*, switch *b⁴*, ground-line *c*, telephone *r*, switch *s*, signal-instrument *t*, and common line *d* with a return-circuit of such lines of the group as are at the time connected with line *d*, substantially as shown and described.

2. The circuit consisting of two subscribers' telephone-lines, connected through the central office, one line being grounded at its terminal station, the other line connecting from the telephone-switch of its subscriber's station to a line common to the group, and one or more lines of the group connecting said common line with the line of the listening operator.

3. The circuit of a telephone-line, beginning at the common line of the listening operator and passing through a switch to a subscriber's line, and thence to the telephone-switch of said subscriber's station, and thence normally through the call-bell to a line common to the group of telephone-lines, and thence by one or more lines of said group to the said common line of the listening operator, in combination with a calling-battery in said circuit, substantially as shown and described.

4. The combination of the group of subscribers' lines *e'* *e²* *e³*, &c., the wire *g*, common to the

lines of the group, the line h , connecting the outer ends of the lines of the group, the battery o , and switches $f^1 f^2 f^3$, &c., substantially as shown and described.

5 5. The groups of subscribers' lines $a^1 a^2$, &c., and $e^1 e^2$, &c., normally connected at the central office through listener's telephone n to earth, in combination with lines d and h , substantially as shown and described.

10 6. The telephone-switch s , in combination with the subscriber's line and the common line connecting the outer ends of the group.

15 7. Two or more groups of telephone-lines, each group in combination with an outer common line, and at the central office with a listening operator's telephone and one or more switches, whereby the groups may be united or separated as occasion may require, substantially as and for the purpose specified.

20 8. The key u , combined with the circuit connecting subscriber's telephone with common line d , whereby the subscriber may close a circuit over the lines of the group connected with line d to the ground-wire of the listening operator.

25 9. The combination of the group of telephone-lines $e^1 e^2 e^3$, &c., the wire g , common to the

lines of the group, common line h , connecting the outer ends of the lines of the group, and the switches $k l$, or their equivalent, substantially as and for the purpose specified. 30

10. The combination of the switches s and u , under the control of the subscriber, with circuits, substantially as shown, whereby the subscriber may converse with the central office 35 over his individual line, or by a circuit over one or more lines of the group to which his line belongs.

11. The switches s and u , signal-instrument t , and telephone r at subscriber's station, in 40 combination with individual line a^1 and common line d , substantially as and for the purpose specified.

12. The combination of key u with common wire d and subscriber's line a^1 . 45

13. The combination of a group of telephone-lines with a common line connecting their outer ends, and polarized bells, one at each subscriber's station, responding to currents in but one direction.

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Witnesses:

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