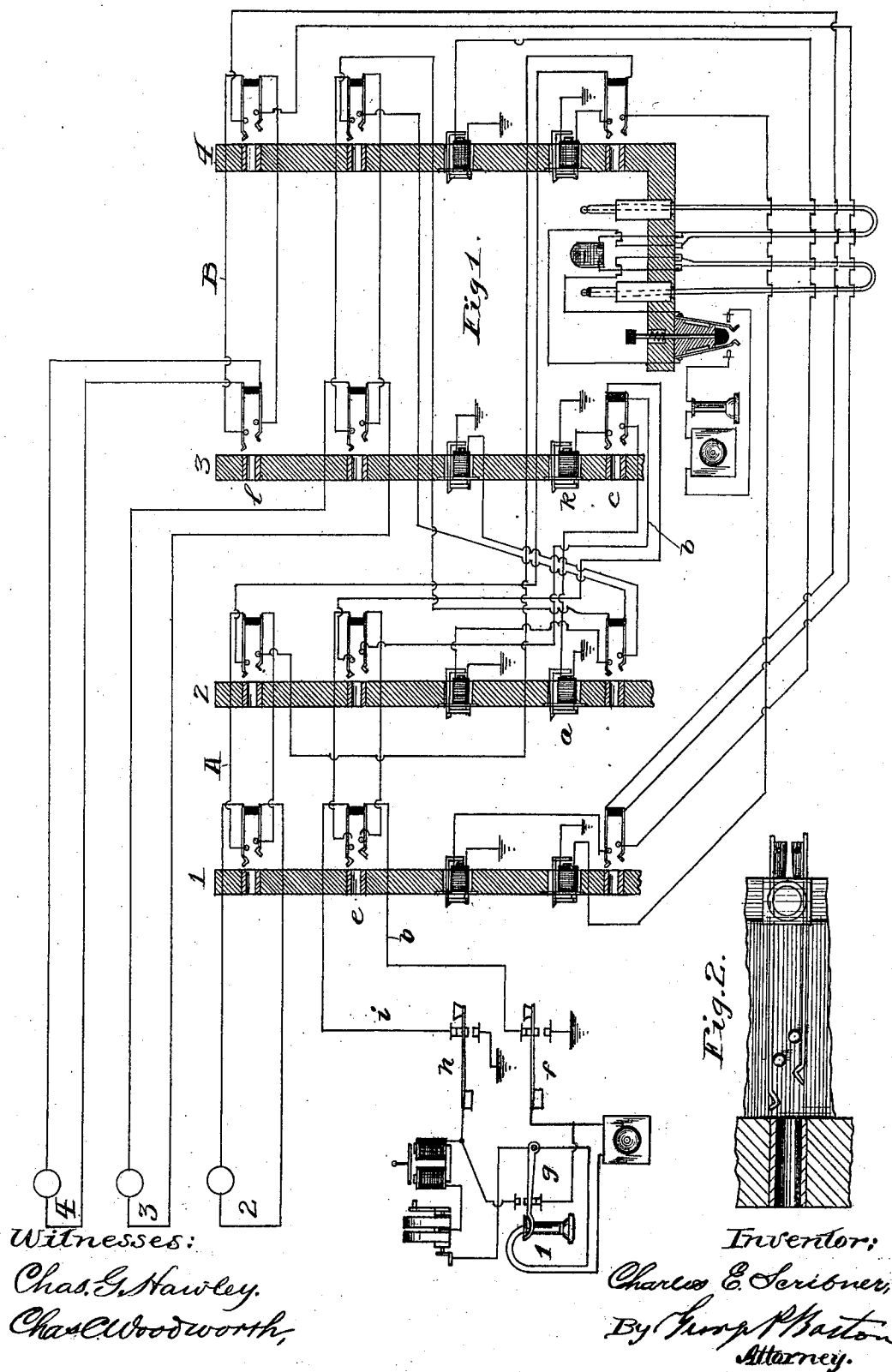


(No Model.)

C. E. SCRIBNER.
TELEPHONE EXCHANGE APPARATUS.

No. 502,770.

Patented Aug. 8, 1893.



UNITED STATES PATENT OFFICE.

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

TELEPHONE-EXCHANGE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 502,770, dated August 8, 1893.

Application filed October 15, 1888. Serial No. 288,139. (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 Apparatus, (Case No. 170,) 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.

In telephone exchanges it has been heretofore common to provide several terminals or switches for each line and to group these terminals in such manner that each of several operators or switchmen may have room to work in making the connections and disconnections. This system is generally known as the multiple switchboard system. Each line has been provided with a single annunciator and with as many switches or terminals as there are switchboards. The individual annunciators of the different lines are distributed among the different boards in such manner that each operator may have as nearly as may be the same number of subscribers to answer. An operator at any board having received a call is enabled to connect the calling subscriber's line with the line of any other subscriber of the exchange, since each board is provided with a different terminal or switch for each of the telephone lines. This system within certain limits has been found the quickest and most satisfactory of any heretofore known or employed, since the different operators may do the entire work of connecting and disconnecting the particular lines assigned their respective boards with one another or with any other of the lines of the exchange. When, however, the number of lines is very large and the possible connections of each subscriber thereby largely increased, it is found that the number of lines assigned to each board must be correspondingly decreased. Speaking generally, the greater the number of lines in an exchange, the greater will be the number of calls made by each particular subscriber, and, consequently, the greater will be the amount of switchboard room required. For example, the lines of an exchange of a thousand subscribers might be conveniently handled on four switchboards, each operator being re-

quired to attend to the initial calls of two hundred and fifty subscribers, and the whole number of switches or terminals in the exchange required being four thousand. In an exchange having three thousand subscribers, not more than two hundred lines should be assigned to one switchboard; hence the number of switchboards required would be fifteen and the number of terminals would be forty five thousand. Now, if instead of assigning two hundred to each board, two hundred and fifty should be assigned to each board, only twelve boards would be required and the whole number of terminals in the exchange would be thirty six thousand. It thus appears that the cost of providing switchboard room increases in a much greater ratio than the actual ratio of increase of subscribers and that the pure multiple switchboard system on this account becomes too expensive after an exchange becomes very large.

My invention herein relates to multiple switchboard systems in which metallic circuits are employed, and its object is to reduce the number of switches or terminals heretofore required in such systems in order that it may be commercially practicable to run from six to ten thousand telephone lines into the same office and provide ready means for connecting any two of these lines together on any one of several switchboards.

I have deemed it unnecessary to describe or illustrate any test system or means for determining at one board whether a line called for is in use or connected at any other of the boards, since there are various systems of doing this work which are well known and which might be readily applied by any one skilled in the art.

My invention consists in dividing the switchboards into two groups and providing a switch or terminal for each of, say, half the lines on each board of one of the groups, and a terminal or switch for each of the other half of the lines upon each of the boards of the other group and including in each limb of each metallic circuit a different individual annunciator, the two annunciators of each line or metallic circuit being placed each on a board of a different group of the boards, with signaling apparatus at the different subscribers'

stations for sending current over either limb of the metallic circuit to throw down the shutter of one division or other division of the exchange at the will of the subscriber, the lines of one division being provided each with an answering spring jack near the annunciator of the line upon a board of the other division. The subscribers must be instructed that the terminals of lines below a certain number are of one division, as division A, and that the terminals of the lines above that number are found in the other division. Thus, a subscriber looking at his directory would at once know to which division of the exchange a subscriber of a given number belonged, and therefore would send current over one limb or the other of his metallic circuit to throw down the shutter which is upon a board of the division of the exchange to which the wanted subscriber belongs.

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

Figure 1 is a diagram illustrative of a telephone exchange divided in two divisions, two multiple boards being shown in section in each division with the circuits of four telephone lines connected therewith in accordance with my invention, the circuit of one line being shown in detail. Fig. 2 is a detailed view of the preferable form of springjack switch.

Switchboards 1 and 2, we will say, belong to division A, while switchboards 3 and 4 belong to division B. The subscribers' stations 1 and 2 are connected each with a different springjack switch or terminal on each of the boards of division A and with a springjack switch on one board only of division B. Stations 3 and 4 are connected each with a different springjack on each of the switchboards of division B and also each with a springjack switch or terminal upon one board only of division A.

I will now describe and trace the circuit of station 1 in detail, it being understood that the other subscribers' stations of the exchange are provided with the same apparatus and connected with the central office in the same manner. Beginning at ground near annunciator *a* of board 2, the circuit of station 1 may be traced through said annunciator *a* by limb *b* through the lower spring and contact of answering switch *c* on board 3; thence through the lower contact and spring of switch *d* upon board 2; thence through the lower spring and contact of switch or terminal *e* upon board 1; thence to key *f* at station 1; thence to the telephone switch *g*; thence through the generator and bell to key *h*; thence by limb *i* through the upper spring and contact of switch *e*; thence through the upper spring and contact of switch *d* upon board 2 of division A; thence through the upper spring and contact of springjack switch *c* upon board 3 of division B; thence through the annunciator *k* on said board 3 and thence to ground. By means of key *h*, limb *b* may

be closed to ground at station 1 to bring the generator into circuit and thus, by turning the generator, current may be sent over limb *b* to operate annunciator *a* upon board 2 of division A. By depressing key *f*, at station 1, limb *i* may be closed to ground at said station 1 and by turning the generator, current may be sent over line *i* to throw down the shutter *k* upon board 3 of division B of the exchange. Thus each subscriber is provided with a metallic circuit. One limb of the metallic circuit, as limb *b*, is provided with an annunciator upon a board of division A, while the other limb *i* of the metallic circuit is provided with an annunciator *k* upon a board of division B of the exchange.

Suppose subscriber 1 wishes a connection with another subscriber of the exchange. As soon as he looks up the number of the subscriber wanted, he will know to which division of the exchange the subscriber wanted belongs. We will suppose that the subscriber wanted is the one at station 2. Subscriber 1 will know that the subscriber wanted belongs to division A. He will therefore depress key *h* and send current over branch *b* whose individual annunciator *a* is upon a board of the division or group A. Thus, having thrown down the shutter *a*, the operator at board 2 is notified of the call, and proceeds to answer it and make the connections in the usual manner. We will now suppose that subscriber 1 wishes to talk with subscriber of station 4. He will now depress key *f* and operate his generator, sending current over limb *i* through annunciator *k* upon a board of the group or division B to which subscriber 4 belongs. The operator at board 3 will thereupon proceed to make the connections between the answering springjack *c* of subscriber 1 and the springjack *l* of subscriber 4 upon said board 3 in the usual manner. Thus by my system each subscriber is required to have a springjack switch or terminal upon each of the boards of one division and one springjack switch additional upon some one of the boards of the other division in connection with an additional individual annunciator. The usual keyboard apparatus is provided at each board, as illustrated at board 4.

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

1. A metallic circuit extending from a subscriber's station to a telephone exchange central office, in combination with multiple switchboards in groups or divisions, both limbs of said metallic circuit extending through and being connected with a different switch upon each of the boards of one division and with a switch upon one board of the other division, one limb of said circuit containing an individual annunciator upon a board of one division and the other limb of said circuit containing an individual annunciator on a board of the other division, and signaling apparatus; whereby either individ-

ual annunciator may be operated from the subscriber's station of the line.

2. The combination with two telephone line wires extending from a substation to a central station, of terminal springjacks upon each of two switchboards connected with both line wires, an annunciator upon each of said switchboards connected to different line wires, and contact points included in both lines adapted to be separated by the insertion of a

plug in any springjack, whereby both annunciators are disconnected when connection is made to the line, substantially as described.

In witness whereof I hereunto subscribe my name this 28th day of July, A. D. 1888.

CHARLES E. SCRIBNER.

Witnesses:

CHAS. G. HAWLEY,

CHAS. C. WOODWORTH.