

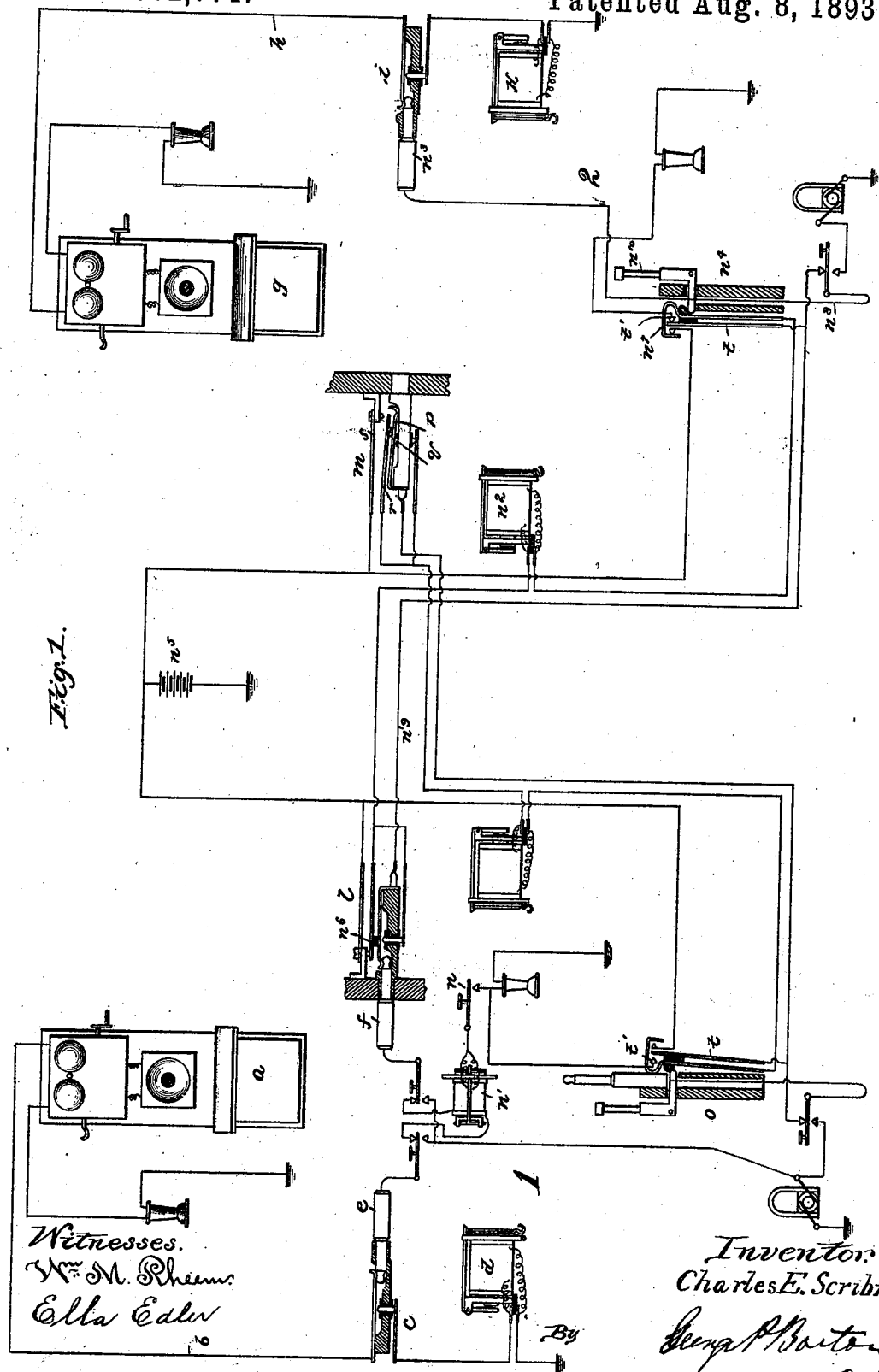
(No Model.)

2 Sheets—Sheet 1.

C. E. SCRIBNER.
TRANSFER SYSTEM FOR SWITCHBOARDS.

No. 502,771.

Patented Aug. 8, 1893.



(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

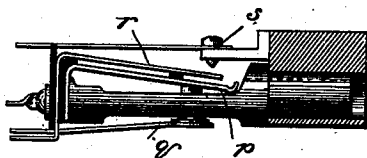


Fig. 3.

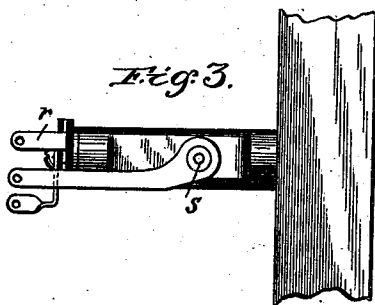


Fig. 4.

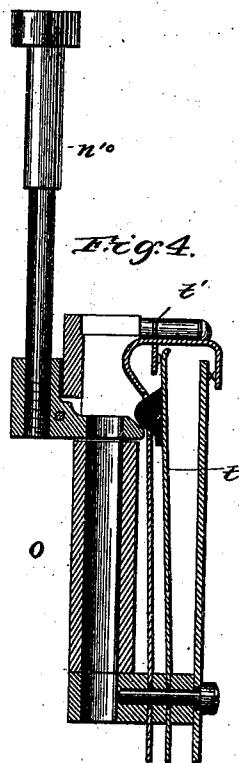


Fig. 5.

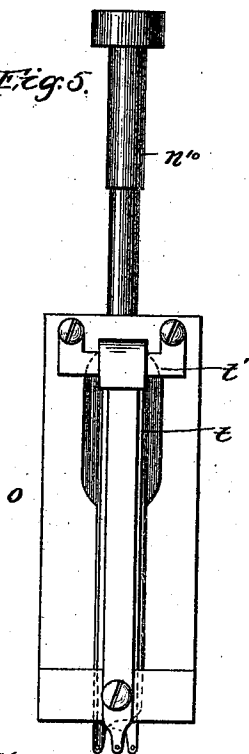
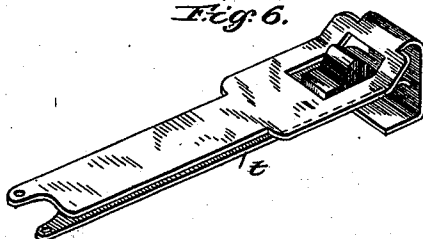


Fig. 6.



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UNITED STATES PATENT OFFICE.

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

TRANSFER SYSTEM FOR SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 502,771, dated August 8, 1893.

Application filed October 27, 1890. Serial No. 389,405. (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 Transfer Systems for Switchboards, (Case No. 232,) 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 in which standard or table switch boards are employed, each table or switch board having switches and annunciators for a different set or group of lines; several such switch boards or tables may be used in the same exchange with means for transferring the connections between the different switch boards or tables. Several different transfer systems have been heretofore employed in such exchanges. Each operator is provided with a sufficient number of transfer wire connections and suitable apparatus extending to each other operator of the exchange to enable her to transact the business originating at her table.

My invention herein relates to such transfer apparatus and circuits, and its objects are, first, to enable an operator at one board to throw her subscriber into connection with the operator of another board, and by the act of such connection to indicate upon an annunciator at the other board that such a connection has been made; second, to enable the operator at the second board to complete such connection and by the act of completing the connection to indicate to the operator at the first board that such has been done; third, my invention comprises circuits for the different subscribers' groups upon different switch boards and transfer apparatus consisting of different transfer wires connected between the boards, each separate transfer connection comprising two clearing out annunciators so arranged that only one of said clearing out annunciators will be included in the circuit while the other clearing out annunciator will be brought into circuit on the removal of the first; and, fourth, the provision of circuits and annunciators to give the operators warning of any accidental disconnection of the

connection before the use of such connection has terminated, consisting in the switching apparatus, whereby a battery is closed through the one or the other of the clearing out annunciators as the case may be as one or the other of the plugs is accidentally removed.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a diagram illustrative of two telephone lines, the different switch boards of the same exchange connected together, one of my transfer connections uniting said lines. Fig. 2 is a side elevation of the transfer switch. Fig. 3 is a view from below of the same. Fig. 4 is a side elevation in section of the listening key operated by the plug. Fig. 5 is a front elevation thereof. Fig. 6 is a perspective view showing the slot through one of the spring and rubber projections through the same which is mounted upon another of the springs.

The transfer switch as shown in Figs. 2 and 3 is of well known construction. A plug inserted therein completes a connection between the spring and the plug, the movement of this main spring serving to close a separate set of contacts with which the switch is provided.

The listening key shown in Figs. 4, 5 and 6 is a form heretofore invented by me and shown in one or more of my pending applications.

Referring now to Fig. 1 the subscriber's station *a* is provided with the usual telephone outfit and is connected by wire *b* with an ordinary switch *c* upon one of the switch boards of the exchange, and thence in the usual manner through individual annunciator *d*. It will be understood that a group of telephone lines will thus be connected with each board—say a hundred. The operator will be provided with the required number of cords and plugs *e f* and with the usual telephone and signaling apparatus. The subscriber's station *g* is also provided with the usual subscriber's outfit. The line *h* extends from ground at station *g* through an ordinary spring jack switch *i* and thus in the usual manner through individual annunciator *k* to ground. Station *g* and its line *h* and its

switch *i* and annunciator *k* may be considered as belonging to a group or switch board distinct from that of station *a*, and my invention relates more particularly to the means of making the connections and disconnections between two such stations—as station *a* and station *g*—of two separate groups of lines, or of two separate switch boards; such transfer apparatus being adapted to be used in connection with the ordinary pairs of cords and plugs and telephone outfits of the different operators. I have shown in Fig. 1 only one such transfer wire and its connections from each operator's table or outfit 1 to the other operator's table or outfit 2. Thus by means of the transfer switch *l* and its connections operator 1 may transfer any line of her group to the operator at station 2 to enable the operator at station 2 to complete the connection with the line called for; by means of transfer switch *m*. The operator at station 2 (being provided with pairs of cords and plugs similar to the pair *e f* of operator 1) may transfer the connection of any line of her group to operator 1 to permit operator 1 to complete the connection.

I will now describe the manner of making the transfer connections and I will assume that subscriber of station *a* desires a connection with the subscriber of station *g*. Subscriber of station *a* first operates individual annunciator *d* and takes down his telephone. Operator 1 answers by inserting plug *e* of a pair in switch *c* as shown and making connection with her telephone by a suitable switch *n*. The operator now listening receives the order for connection with subscriber of station *g*; thereupon she inserts the other plug *f* of the pair in the transfer switch *l* of the transfer line extending to the board upon which is placed switch *i* of subscriber *g*. The insertion of the plug *f* serves to operate annunciator *n'* and also the transfer annunciator *n²* of operator 2. It will be understood that when plug *f* is thus inserted in transfer switch *l* that the connecting plug *n³* is removed from switch *i* and is resting in the socket of the switch *n⁴*. The circuits formed when plug *f* is thus inserted may be traced from ground through battery *n⁵*, through the contacts *n⁶* of transfer switch *l* and thence through transfer annunciator *n²* and thence to the spring *n⁷* of switch *n⁴* and thence to the heel of plug *n³* and thence to the cord *n⁸* of said plug and thence by wire *n⁹* to the transfer switch *l* and thence as shown through annunciator *n'* to plug *e* and switch *c* and over line *b* to ground at the station of subscriber *a*. Thus annunciators *n'* and *n²* are brought into the circuit of the battery *n⁵*. The plug *f* is practically grounded, being connected to earth through the remainder of the cord circuit and the subscriber's line; hence I term it a "grounded terminal plug." The operator 2 seeing the shutter of annunciator *n²* fall immediately lifts plug *n³* from the socket of the switch *n⁴* corresponding to annunciator *n²*

and receiving the order repeated by operator 1 or subscriber *a* at once inserts a plug *n³* in switch *i*, thus completing the connection. As soon as the plug *n³* is lifted from its socket in switch *n⁴* the circuit of the battery *n⁵* through annunciator *n'* is opened (the magnet of annunciator *n²* being also de-energized) and thus operator 1 finding that annunciator *n'* will remain up knows that the order has been received and is being attended to by operator 2. Operator 2 having thus completed the connection may throw the lever *n¹⁰* of switch *n⁴* so as to disconnect her telephone. The circuit of the two subscribers thus connected together may be traced from ground at station of subscriber *a* over line *b* through switch *c*, pair of plugs *e f*, over wire *n⁹* to cord *n⁸* and plug *n³* and thence through switch *i* over line *h* to ground at station of subscriber *a*. Clearing out annunciator *n'* being in the circuit either subscriber by sending current to line may signal operator 1 to disconnect. On removing plug *f* the contacts *n⁶* will be opened and hence battery *n⁵* will find circuit through annunciator *n²*, thus notifying operator 2 that the disconnection has been made. The circuit from battery *n⁵* may be traced from ground through the battery, thence to spring *n⁷* of switch *n⁴* and thence through annunciator *n²* and thence through the contact and spring of switch *l*, and thence over wire *n⁹* to cord *n⁸*, plug *n³*, switch *i*, wire *h* and to ground at station of subscriber *g*. Thus it will be seen that when two telephone lines are connected the clearing out annunciator of the pair of cords used in making the connection between the switch of the calling line and the transfer switch will be left in circuit; when this clearing out annunciator is operated and the calling line disconnected from the transfer switch the transfer annunciator *n²* will be automatically operated to notify the operator at the board of the subscriber called of the clearing out signal; thereupon the operator thus notified will withdraw the connecting plug, as *n³*, from the called subscriber's switch and restore the same to its normal position in the socket of its switch as *n⁴*.

I have shown the plug of the listening key *o* of the outfit of operator 1 with its plug resting in its socket, its metallic heel acting as a wedge to separate the spring from its connection with the battery *n⁵*.

I have not deemed a detail description of the transfer switch as shown in Figs. 2 and 3 necessary. Suffice it to say that a plug being inserted lifts spring *p* from its normal contact *q*; spring *p* being thus lifted carries contact spring *r* against contact *s*. Thus as heretofore described with respect to transfer switch *l* the insertion of a plug automatically closes the contact spring *r* and contact *s*, that is, closes contacts *n⁶* of switch *l*. When the plug is withdrawn the switch assumes the position indicated in Fig. 2, also indicated at switch *m* of Fig. 1.

The listening key or switch illustrated in detail in Figs. 4, 5 and 6 I have not deemed necessary to describe in detail.

The connecting plug having a metallic heel electrically connected with the cord normally rests in the socket as shown at switch *o* of Fig. 1. On removing this plug from the socket the switch assumes the position indicated at switch *n*⁴ of Fig. 1; also indicated in Figs. 4 and 5. By throwing the lever as *n*¹⁰ the spring *t* may be lifted from its contact *t'* with the telephone. It will be observed that the contacts *n*⁶ of transfer switch *l* will be closed when plug *f* is inserted, and that when the plug *n*³ is resting in its socket in the switching device *n*⁴ the spring *n*⁷ will be in contact with the plug *n*³ and hence in connection with its cord *n*⁵.

The circuit of battery *n*⁵ with respect to the annunciator *n*² is controlled by the transfer switch *l* and the switching device *n*⁴; thus when the plug is removed from transfer switch *l* and plug *n*³ is in its socket there will be no current through annunciator *n*²; insert plug *f* as shown and there will be circuit from battery *n*⁵ through annunciator *n*²; remove plug *n*³ from its socket and current will be cut off from annunciator *n*²; again while plug *n*³ is removed from its socket withdraw plug *f* from transfer switch *l* and current will be restored to annunciator *n*²; in other words we have at the different boards a switching device connected in circuit with a battery and an annunciator; no matter what may be the position of these two switching devices a change in the position of the other switch will either disconnect or connect the battery from the annunciator accordingly as the battery is connected or disconnected from the annunciator at the time the change is made. It will be further observed that the circuit of the battery *n*⁵ through annunciator *n*² may be controlled at either switch board by the switching device of the different operators connected therewith, and it matters not what may be the position of either switching device a change of the circuit at either switching device changes the electrical condition of the annunciator.

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

1. A telephone line extending from ground at a subscriber's station thereon through an annunciator as *n*¹ at one board of an exchange and thence through a switching device as *n*⁴ at another board of the exchange and thence through a battery to ground, whereby on opening the circuit at said switching device the battery is disconnected from the annunciator at the first board, substantially as and for the purpose specified.

2. The combination with a telephone line extending from earth at a substation to an exchange and connected with a conductor terminating in a connecting plug thereat, of a spring jack into which said plug is inserted,

normally separated contact points on said jack closed together by said plug, and a local branch circuit extending from said terminal plug through an annunciator and said normally open contact points to earth, substantially as described.

3. The combination with a transfer line of a signaling circuit normally closed at the sending end thereof, but adapted to be opened when connection is made with the transfer circuit at that end, and normally open at the receiving end thereof but adapted to be closed when connection is made to that end of the signaling circuit, an indicator at the receiving end and a source of electricity in the signaling circuit, substantially as described.

4. In combination with the signaling circuit of a transfer line terminating at one end in a spring jack, and at the other end in a terminal plug, of contact points controlled by the spring jack to open the signaling circuit when a plug is inserted into the jack, a cord switch for the terminal plug adapted to close the signaling circuit when the plug is removed from the socket, and an indicator at the receiving end of the transfer line in the signaling circuit, substantially as described.

5. The combination in a signaling circuit for a transfer system, of a switch at each end thereof adapted to be actuated by the act of establishing connection with the trunk line to alternate between two contact points, one contact of each switch being connected to one pole of a grounded battery, and the other contact of each switch being connected to earth, and a conductor including an indicator joining the levers of the said switches, whereby the circuits are altered to actuate the indicator when either switch is operated, substantially as described.

6. The combination with a transfer line terminating in a spring jack at one end, and in a terminal plug at the other, of a switch controlled by the spring jack, and a cord switch controlled by the terminal plug, each of said switches having a lever adapted to be alternated between a ground contact and a contact connected to one pole of a grounded battery, both of said contacts being connected to the same pole of the same battery, or to similar poles of an equal battery, and a conductor including an indicator at the receiving station connecting the said levers, whereby when either switch is in its normal position, the other being in its alternate position, the said indicator is operated, substantially as described.

7. The combination with a spring jack at one switchboard, of a local branch circuit extending from said spring jack to earth through an annunciator at another switchboard and a battery, and normally open at contact points upon said spring jack adapted to be closed together by the insertion of a plug into said jack, and a grounded terminal plug adapted for insertion into said jack, substantially as described.

8. The combination with a spring jack at one switchboard, of a grounded connecting plug thereat adapted for insertion into said jack, circuit connections from said jack to a terminal plug at another switchboard, an annunciator thereat, a cord switch socket for said terminal plug, and local circuit connections extending from said terminal plug to earth through said annunciator, the contact points of said switch, and a source of electricity, substantially as described.

9. The combination with a spring jack at one switchboard, of a terminal plug connected therewith at another switchboard, a normally closed cord switch socket for said plug, and an annunciator thereat, normally open contact points upon said spring jack adapted to be closed together when a plug is inserted into the jack, and a conducting circuit including said contact points upon the spring jack, the contact points of the cord switch, said annunciator, and a battery, whereby the annunciator is operated when a plug is inserted into

the spring jack and its circuit is opened when the terminal plug is removed from its socket, substantially as described.

10. The combination with a spring jack at one switchboard, provided with normally closed contact points adapted to be separated when a plug is inserted into the jack, of a terminal plug at another switchboard connected with the line spring of said jack, an annunciator at said second board, a local circuit extending from ground through said contact points on the spring jack, the annunciator, and a source of electricity and connected with said terminal plug, and a telephone line connected to earth and terminating in a spring jack into which said terminal plug is inserted, substantially as described.

In witness whereof I hereunto subscribe my name this 9th day of October, A. D. 1890.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,

GEORGE P. BARTON.