

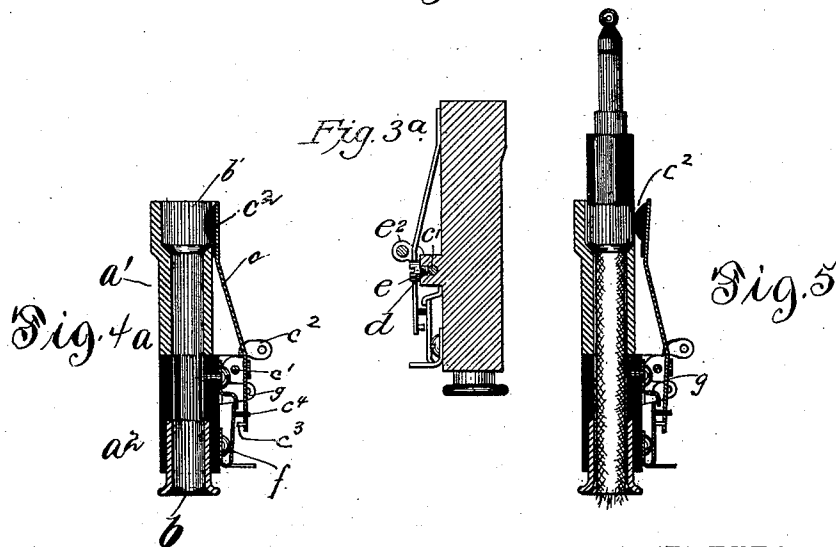
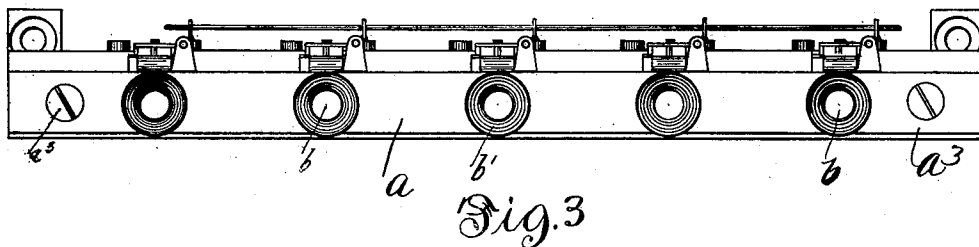
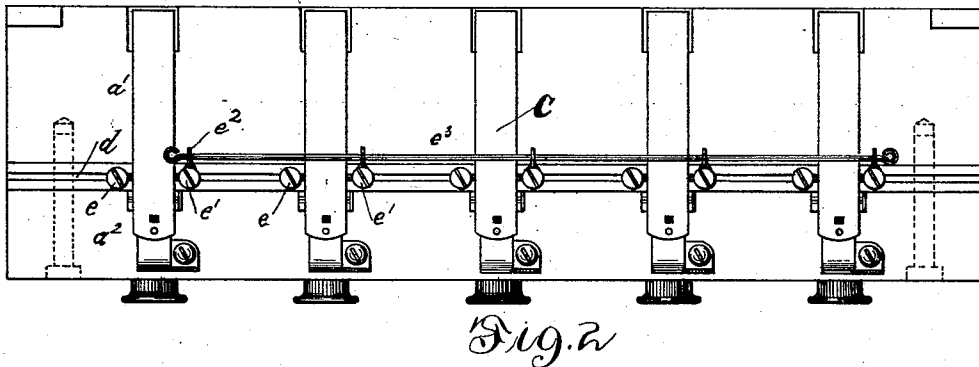
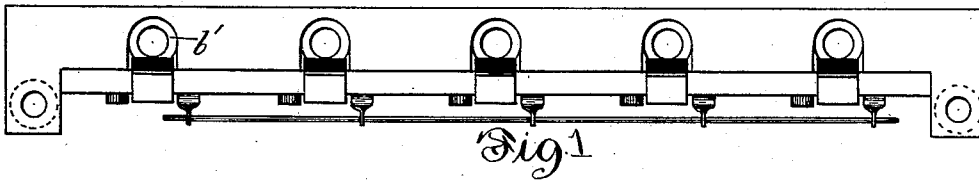
(No Model.)

2 Sheets—Sheet 1.

C. E. SCRIBNER.
CORD SWITCH FOR TELEPHONE SWITCHBOARDS.

No. 572,219.

Patented Dec. 1, 1896.



WITNESSES:
George L. Bragg.
Walter Clyde Jones

INVENTOR:
Charles E. Scribner
By *Barton & Brown Attys*

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2 Sheets—Sheet 2.

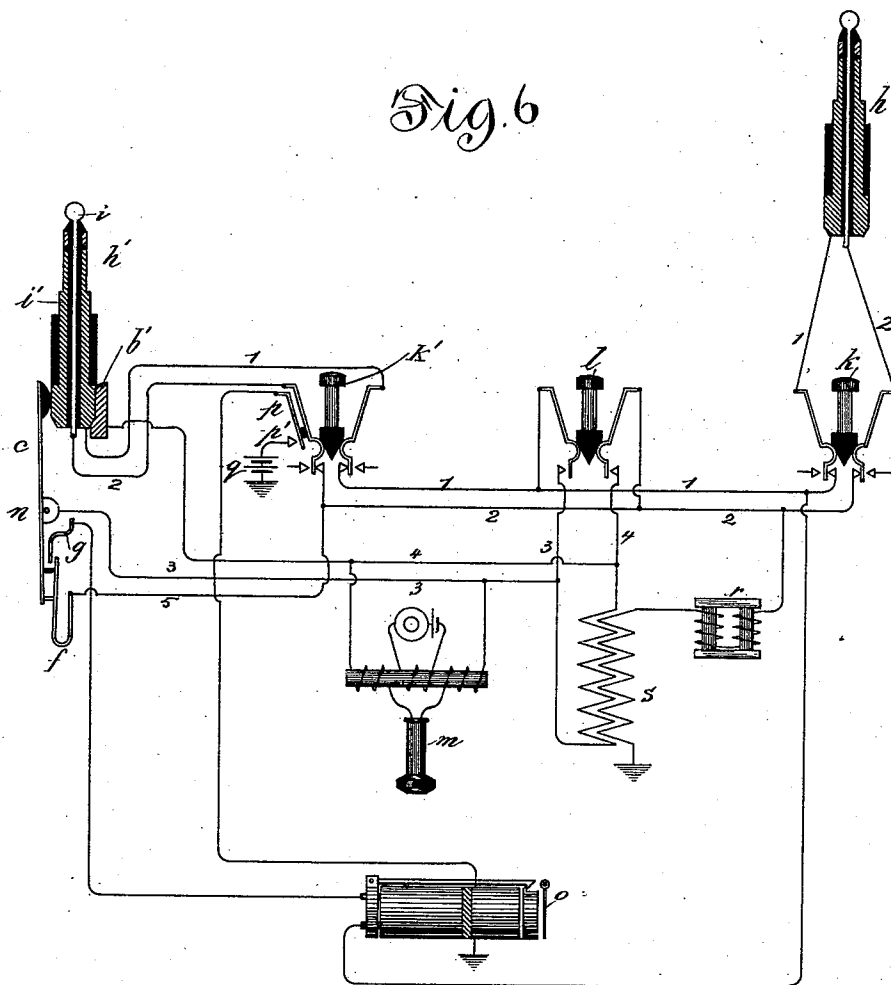
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Fig. 6



WITNESSES:

George L. Cragg
Walter Clyde Jones

INVENTOR:

Charles E. Scribner
By Barton & Brown Attys

UNITED STATES PATENT OFFICE.

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

CORD SWITCH FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 572,219, dated December 1, 1896.

Application filed May 14, 1894. Serial No. 511,207. (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 Cord Switches for Telephone-Switchboards, (Case No. 353,) 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 the keyboard apparatus of switchboards for telephone-exchanges, particularly to apparatus for automatically altering circuit connections by the withdrawal of the connecting-plug and its attached cord from its normal resting-socket or its replacement in the socket. Hitherto cord switches for this purpose have been commonly employed, consisting of springs tending to project into the resting-socket of the plug arranged to alter the circuit connections when forced outward by the forcible insertion of the plug in its socket. This necessity for the forcible insertion of the plug into the cord switch has been objectionable in that it required otherwise unnecessary manipulation of the connecting-plugs, and the presence of the contact-points in the immediate neighborhood of the plug-socket has permitted the accumulation of dust upon them, thus rendering their action more or less unreliable.

In my improved cord switch I have aimed to avoid the necessity for the forcible insertion of the plug in its resting-socket and to remove the switch contact-points to a distance from the socket, at the same time shielding them from dust. I have therefore constructed my invention with a switch-lever of the first class, one extremity of the switch-lever projecting into the resting-socket of the plug and the other extremity being arranged to operate the various switch contact-points. The arm of the lever controlling the contact-points is made much shorter than that which is acted upon by the plug, so that sufficient pressure between the contact-points may be obtained without requiring the exertion of greater force upon the plug in inserting it in its resting-socket than the weight of the plug and its attached cord and pulley weight.

My invention involves certain minor details of construction and of circuit connections, which may be most clearly described in connection with the drawings accompanying the specification.

I have arranged my cord switch for the especial purpose of controlling the connection of the operator's telephone and of the clearing-out annunciator with the corresponding plug-circuit, the operations being to disconnect the operator's telephone from the plug-circuit and to connect the clearing-out annunciator therewith when the plug is removed from its socket and to effect the reverse connections when it is replaced.

Of the drawings accompanying this specification, illustrative of my invention, Figure 1 is a plan of a number of my improved cord switches mounted together upon a common support or frame in the usual way. Fig. 2 is a side elevation of the same. Fig. 3 is a view of the frame from beneath. Fig. 3^a is a transverse section of a portion of the strip. Fig. 4 is a vertical central section of a cord switch and plug-socket, the plug being removed from its socket. Fig. 5 is a similar view with the plug inserted in its socket and the cord switch in the corresponding position. Fig. 6 represents diagrammatically a pair of connecting-plugs with their uniting plug-circuit and accessory apparatus, the operator's telephone and the clearing-out annunciator, and a cord switch for controlling the connections of the latter.

Referring to Figs. 1 to 5, inclusive, I will first describe the mechanical construction of the cord switch. The frame *a* is constructed in two portions *a'* and *a''*, the former being of metal and the latter of insulating material, as hard rubber. The two portions are secured together by screws *a'''*. The entire frame is perforated transversely by openings *b* to permit the passage of the connecting-cord, the openings being enlarged at their upper extremities to form sockets *b'* to receive the lower end of the connecting-plug. The switch-lever *c* of the cord switch is pivoted upon a pin *c'*, whose extremities lie in a groove *d* in a raised rib upon the hard-rubber portion *a''*, being secured in place by two screws *ee'*. The construction of this groove and the

position of the pivot in it are best represented in Fig. 3^a. This mode of fixing pivots in place is especially useful in the construction of strips or groups of cord switches as here-
 5 in illustrated, since a continuous groove d the full length of the strip may form the support of the levers of all the cord switches upon the strip. A lug e^2 is fastened under the screw e' and projects outward to facilitate
 10 electrical connection with the lever. The lugs e^2 may be connected together by a wire e^3 , extending the full length of the strip. If desired, separate connections may, however, be made with the lugs. The upper extrem-
 15 ity of lever c projects a slight distance into the plug-socket b' , the metal of the frame being cut away to permit its entrance. It is faced at c^2 with hard rubber at the point where it bears upon the plug to maintain its
 20 insulation from the latter. At its lower extremity lever c carries a contact-point c^3 and a stud c^4 of insulating material, placed at different distances from its fulcrum c' , so that they move through different ranges as
 25 the lever oscillates, the contact-stud c^3 being placed farther from the fulcrum. Beneath these parts a contact-spring f is placed, having one end fixed upon the rubber piece a^2 . When the switch-lever is in the position
 30 shown in Fig. 4, the plug being removed from its socket, the spring f bears upon the insulating-stud c^4 , pressing the corresponding extremity of the lever so far outward that the contact-pin c^3 is raised from spring f . When
 35 the plug is inserted in the socket, as in Fig. 5, the lever is forced into its alternate position and the contact-pin c^3 , moving through a greater range than insulating-stud c^4 , comes to bear upon the spring f and separates it
 40 slightly from stud c^4 . The spring f is provided with a stop g , which limits its outward movement, making electrical contact with it after the stud c^3 is separated from spring f . Thus as the lever c is oscillated the spring
 45 f makes contact alternately with the contact-pin c^3 and the stop g . Spring f and stop g are both provided with perforated lugs, by which electrical connection may be made with them.
 50 It will be noted that by this arrangement of the contact-points the contract-spring f itself serves to alter the position of lever c when the plug is removed from its socket, and that it exerts its full pressure upon its stop g .
 55 Thus the whole force which the weight of the cord and plug can be relied upon to overcome in drawing the plug into its socket will be exerted by the spring f upon its stop g to insure a firm electrical connection therewith;
 60 also when the plug is in its socket the full pressure of the spring f is brought to bear upon the contact-pin c^3 , insuring firm connection with this pin also. The stop g is preferably made broad, so that whatever dust may
 65 fall between the lever c and the frame will collect upon the upper surface of stop g and will be prevented from falling upon either

pair of contact-points. Very little dust can escape from the socket b' , however, since while the plug is in its socket this is tightly closed,
 70 and while the plug is out of its socket the opening in the socket is closed by block c^2 .

In Fig. 6 the essential elements of this cord switch are represented diagrammatically in connection with a pair of connecting-plugs
 75 and their accessory appliances. The use of these connecting-plugs and their position in a telephone-switchboard are well known, and I do not deem it necessary to fully describe either.
 80

The plugs h h' are each constructed with two insulated contact-pieces i and i' , respectively. The like parts of the two plugs are electrically connected together through con-
 85 ductors 1 and 2. The usual calling and signaling keys k k' are included in these conductors, each arranged to disconnect the corresponding plug from its mate and to connect its terminals with the poles of a generator of
 90 signaling-current. (Not shown.) A listening-key l is also provided, adapted to connect conductors 3 and 4 with conductors 1 and 2, respectively, when its plunger is depressed. The conductors 3 and 4 constitute the termi-
 95 nals of an operator's telephone set m , which accordingly may be connected with conductors 1 and 2 of the plug-circuit by depressing the listening-key l . Its connection with this
 100 circuit is, however, ordinarily controlled by the cord switch n , which is applied to the plug h' . The lever c of the cord switch is connected with conductor 3, and the spring f is
 105 connected by conductor 5 with conductor 2 of the plug-circuit, the conductor 4 being joined to the frame of the socket b' . The usual self-restoring clearing-out annunciator o is provided for each plug-circuit, its connection
 110 with the plug-circuit being also controlled by the cord switch n . One of its terminals is connected with conductor 1 of the plug-circuit, and its other terminal is carried to the
 115 stop g . Thus with the apparatus in the position shown in the drawings the circuit of annunciator o is open at the point of separation of spring f from its contact-stop g , while
 120 the circuit of telephone m is closed by the cord switch in a bridge between conductors 1 and 2. The connection may be traced from the sleeve i' of plug h' to its metallic socket
 125 b' , thence to conductor 4, through telephone m , to conductor 3, thence to the lever c of the cord switch, to spring f , through conductor 5, to conductor 2 of the plug-circuit.

The usual local circuit is arranged for restoring the clearing-out annunciator o , but
 125 the continuity of this local circuit is controlled by the calling-key k' . An auxiliary spring p is provided upon this key with a contact-anvil p' , against which it is pressed when the key is used in sending a signaling-current.
 130 An earth connection is made from conductor 2 through impedance-coil r and one helix of an induction-coil s . The other helix of the induction-coil is connected between conduc-

tors 3 and 4, being thus in parallel circuit with the telephone.

In the use of this apparatus the plug *h* may be employed in making the initial connection with the subscriber calling, plug *h'* serving to complete the connection with the line called for. Having received a call and made connection with the line of the calling-subscriber, the operator finds her telephone already connected with the conductors 1 2 of the plug-circuit and in position to receive the order for the desired connection, the circuit to the telephone being through the cord switch as before traced. Having received the order, she raises the plug *h'* to complete the connection. By this movement the cord switch is thrown into its alternate position, automatically disconnecting her telephone from the plug-circuit and at the same time closing the connection of the clearing-out annunciator *o* with the same. The operator then tests the line called for in the usual way by applying the tip *i* of plug *h'* to the test-ring of the line in question, the test-current, if any exists, finding circuit from conductor 2 to earth through the impedance-coil *r* and one helix of the induction-coil *s*. The impulse of current through the latter will induce a current in the other helix of the coil, which will find circuit through the telephone *m* and will produce the usual click therein. Having made the connection with the line called for, the operator depresses calling-key *k'*, thus transmitting a signaling-current through plug *h'* over the line with which it is connected and at the same time closing contact-points *p p'* and resetting the clearing-out annunciator *o*, if the latter be not already in position to give an indication. When the conversation is finished and the plugs are withdrawn from the spring-jacks, they are returned automatically to their sockets by the weight of the attached cords and pulleys, the plug *h'* being drawn into its switch and operating the latter without manipulation by the operator.

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

1. In combination a socket and a resting-plug resting therein, a lever of the first class having one extremity bearing upon the side of said plug, switch-contacts actuated by the other extremity of said lever, and circuit connections with the switch-contacts, substantially as described.

2. The combination with a connecting-plug, of a resting-socket adapted to receive the same, a flexible cord attached to the plug and a weight acting upon the cord to draw the plug into the side of its socket, a lever of the first class having one extremity projecting laterally into the socket adapted to be displaced therefrom by the insertion of the plug in its socket, and switch-contacts controlled

by the opposite extremity of the lever, substantially as described.

3. In a strip or group of cord switches the combination of the metal and the insulating portions of the frame, the rib upon the insulating portion with groove *d*, the switch-levers *c* of the different cord switches, and the pivot-pins *c'* secured in the groove, substantially as described.

4. The combination with the switch-lever *c* having one extremity adapted to be acted upon by the plug when in its socket, of the insulating-stud and the contact-pin upon the other extremity of the lever, at different distances from its fulcrum, and the contact-spring *f* adapted to engage the insulating-stud and the contact-pin alternately as the switch-lever is oscillated, substantially as described.

5. The combination with the switch-lever of the first class having one extremity adapted to be moved by the pressure of the connecting-plug upon it when the plug is in its socket, of the insulating-stud and the contact-pin upon the other arm of the lever at different distances from its fulcrum, the contact-spring adapted to engage the insulating-stud and the contact-pin alternately as the lever is oscillated, and the fixed stop limiting the outward movement of the contact-spring in following the switch-lever, substantially as described.

6. The combination with a pair of connecting-plugs, of a plug-circuit uniting the different members of the pair, a metallic sleeve upon one of said plugs connected with one conductor of the cord circuit, a metallic resting-socket for the said plug adapted to make connection with the sleeve, a cord switch in said socket comprising a switch-lever of the first class, one of whose extremities is adapted to project into the plug-socket when the plug is removed therefrom, a switch-spring controlled by the other arm of said lever to be oscillated between contact-points, the switch-spring being connected with the other side of the plug-circuit, a telephone having one terminal connected with the metallic socket and the other terminal with one of said contact-points; a clearing-out annunciator having one terminal connected with one side of the plug-circuit and the other terminal with the remaining contact-point, whereby when the plug is removed from its socket the circuit of the telephone is opened at two points and the circuit of the clearing-out annunciator is closed, substantially as described.

In witness whereof I hereunto subscribe my name this 9th day of April, A. D. 1894.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,
LUCILE RUSSELL.