(Model.)

C. WILLIAMS, Jr., T. W. LANE & F. W. HARRINGTON.

TELEPHONE SWITCH BOARD.

No. 248,821. Patented Oct. 25, 1881.

Fig. 1.

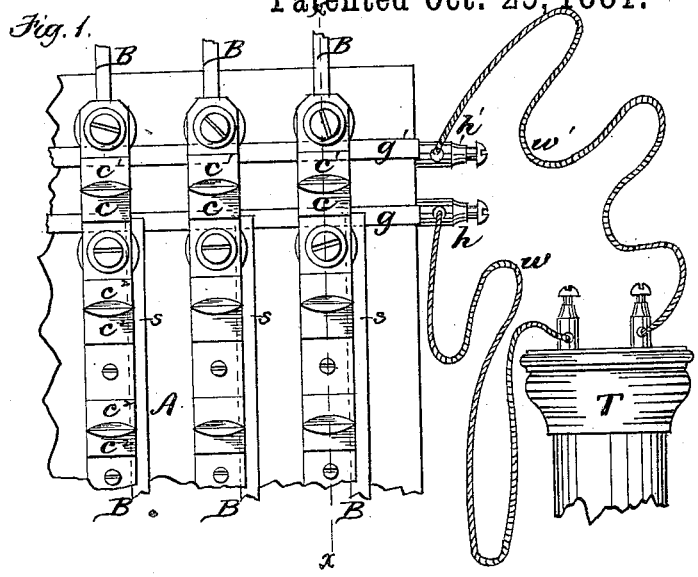


Fig. 2.

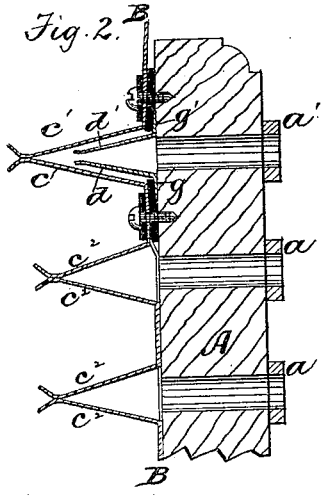


Fig. 3.

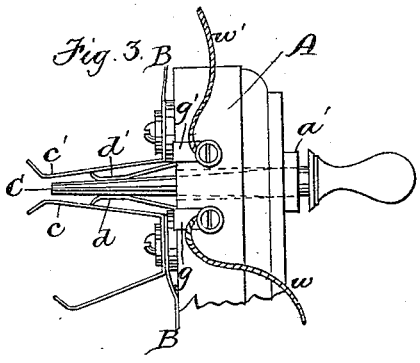
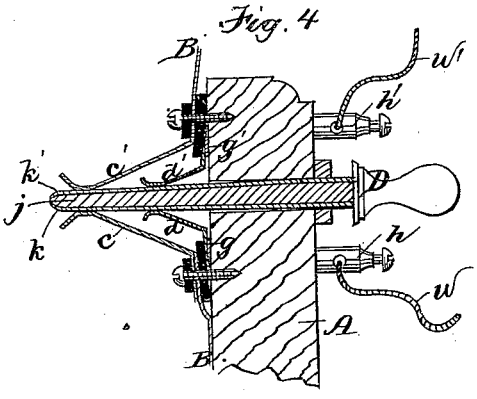


Fig. 4.



Witnesses.
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UNITED STATES PATENT OFFICE.

CHARLES WILLIAMS, JR., OF SOMERVILLE, THOMAS W. LANE, OF BOSTON, AND FRANK W. HARRINGTON, OF SOMERVILLE, MASSACHUSETTS.

TELEPHONE SWITCH-BOARD.

SPECIFICATION forming part of Letters Patent No. 248,821, dated October 25, 1881.

Application filed July 13, 1881. (Model.)

To all whom it may concern:

Be it known that we, CHARLES WILLIAMS, Jr., and FRANK W. HARRINGTON, of Somerville, in the county of Middlesex and State of Massachusetts, and THOMAS W. LANE, of Boston, Suffolk county, in said State, have invented certain Improvements in Telephone Switch-Boards, of which the following is a specification.

This invention relates to electrical switch-boards employed in telephone central offices and exchanges, and has for its object to provide improved means for enabling the operator at the central office to place his listening-telephone into and out of the circuit formed by the line-wires of two subscribers connected together by means of said switch-board in such manner as that the telephone may be put noiselessly into circuit and the transmitted current caused to pass through the telephone without losing its strength by leakage or from any other cause. To these ends our invention consists in the improvements which we will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification, Figure 1 represents a rear view of a portion of a switch-board embodying our invention. Fig. 2 represents a section on line *x x*, Fig. 1. Fig. 3 represents an end view, showing plug introduced and the telephone in circuit. Fig. 4 is a sectional view of a modification.

The same letters indicate the same parts in all the figures.

In the drawings, A is a board or backing of suitable insulating material, arranged upon the front of which are the usual horizontal insulated metallic connecting-strips, *a*, adapted to be connected by means of plugs with the line-circuit strips B, which cross the board at right angles to the strips *a*, and are in this instance arranged on the opposite side of the board from the last-named strips. The line-circuit strips, the connecting-strips, and the devices for connecting them may be of any suitable construction so far as relates to their joint operation. In this case the line-circuit strips are shown as composed of springs c^2 c^2, arranged in pairs, attached at their bases to the board and pressed together normally at their outer ends, and continuous metal strips *s*, extending along the bases of the springs, as shown in the application for United States Letters Patent of THOMAS W. LANE, one of our number, filed June 27, 1881, the connecting-strips being provided with holes coinciding with the meeting faces of the springs c^2 c^2, and receiving plugs adapted to be inserted between the springs of each pair to connect the line-circuit strips with the connecting-strips, as shown in said application.

In carrying out our invention we make each line-circuit strip capable of separation into two distinct parts at a given point, and this is preferably accomplished by means of two springs, *c c'*, in each strip, said springs forming a part of the strip and being attached to the board and normally pressed together at their outer ends, like the springs c^2 c^2, but, unlike the last-named springs, they are entirely disconnected or insulated from each other at their bases, so that when separated and insulated at their outer ends they convert the strip to which they belong into two distinct parts having no electrical connection.

J represents the listening-telephone, which is included in a listening-circuit composed of wires or cords *w w'* and means whereby one of said wires may be connected to one of the parts of either of the line-circuit strips (when the same is broken) and the other wire to the other part, thereby looping in the listening-telephone and causing the entire current to pass around through the listening-circuit in passing through the line-circuit strip, with which said circuit is connected.

The means for connecting the wires *w w'*, respectively, with the parts of the line-circuits are preferably composed of springs *d d'*, arranged between the springs *c c'*, and normally separated from the latter and from each other at their outer ends, as shown in Fig. 2, so that when forced outwardly the springs *d c* and the springs *d' c'* will make contact, as shown in Fig. 3, all the springs *d* being connected with each other and with the wire *w* by a strip or wire, *g*, and all the springs *d'* with each other and with the wire *w'* by a strip or wire, *g'*, through suitable binding-posts, *h h'*. The springs *c c'* and *d d'* are arranged opposite to a listening or central-

office telephone strip, a', on the front of the switch-board, which strip is parallel with the connecting-strips a, and has holes coinciding with the spaces between the springs d d', so that a plug, C, of insulating material, inserted in one of said holes, will first press the springs d d' outwardly against the springs c c', and, secondly, separate the springs c c', as shown in Fig. 3. The line-circuit strips pertaining to the separated springs c c' are thus broken or separated into two parts, neither having any electrical connection with the other, excepting through the listening-circuit, through which the entire current passes from one part of the line-circuit strip to the other.

The operation is as follows: When the operator at the central office wishes to place his office-telephone into a circuit he passes the tapered plug C, made of insulating material, as described, through the hole in the metal listening-strip a' corresponding to the circuit. As the plug C is pressed into said hole its end strikes the inner surfaces of the free ends of the springs d d', causing them to separate and to press against and separate the contact-springs c c', as shown in Fig. 3, the plug not necessarily touching the springs c c'. It will be seen that the path of a current from line B is now by springs c' d', strip g', binding-post h', through the telephone, binding-post h, strip g, springs d and c, thus looping the telephone into the circuit. This operation may be repeated with every line-wire that connects with the switch-board.

By pressing apart the springs d d', as described, before separating the springs c c', all liability of causing clicking noises in the circuit is avoided; but if the springs c c' were separated before the springs d d' touched them, a click might be communicated.

Fig. 4 shows a modification in the plug used, which is composed of a body of insulating material, j, and plates k k', secured to opposite sides. The springs d d' do not in this case touch springs c c', the latter being separated by the plug itself. The springs d d' are separated first and then the springs c c' by the plug. In this case the path of the current would be from line to spring c', through plate k' of plug, spring d', through the telephone, spring d, opposite plate k, to spring c.

It will be readily seen that the act of pulling out a plug puts the telephone out of circuit in a manner as free from disturbance and annoyance to the circuit as when the plug was introduced.

We do not limit ourselves in the application of these devices to the form of switch-board shown and described, as our invention may be readily applied to any form of switch-board.

Having thus described our invention, we claim—

1. In an electrical switch-board, the combination of a series of line-circuit strips, each composed, in part, of separable springs c c', normally pressed together and adapted to be separated to convert the strip into two distinct parts, the springs d d', arranged, as shown, with relation to the springs c c', and connected, as described, in a listening-circuit, and means for electrically connecting the springs c c', respectively, with the springs d d', to loop in the telephone of the listening-circuit, as set forth.

2. In an electrical switch-board, the combination of a series of line-circuit strips, each composed, in part, of separable springs c c', normally pressed together and adapted to be separated to convert the strip into two distinct parts, the springs d d', arranged, as shown, with relation to the springs c c', and connected in a listening-circuit, as described, and a removable plug, C, of insulating material, adapted to be inserted between the springs d d', and thereby first make contact between the springs d c and d' c', and, secondly, separate the springs c c' to break the line-circuit strip and loop in the telephone of the listening-circuit, as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 9th day of July, A. D. 1881.

CHARLES WILLIAMS, JR.
THOMAS W. LANE.
FRANK W. HARRINGTON.

Witnesses:
H. G. WADLIN,
C. F. BROWN.