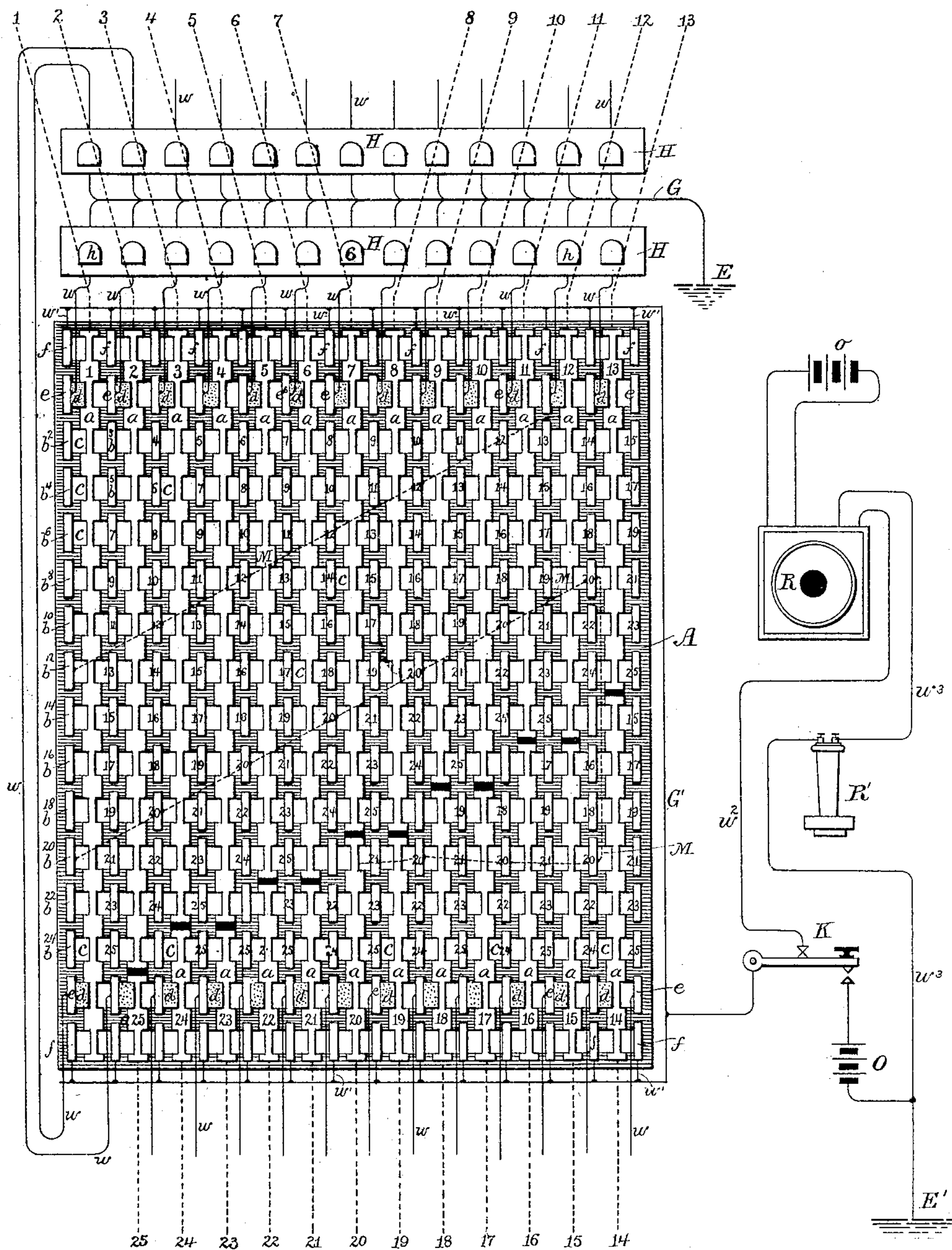


(No Model.)

T. J. PERRIN.
ELECTRIC SWITCH BOARD.

No. 271,913.

Patented Feb. 6, 1883.



WITNESSES

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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH-BOARD.

SPECIFICATION forming part of Letters Patent No. 271,913, dated February 6, 1883.

Application filed September 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. PERRIN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Switch-Boards, of which the following is a specification.

My invention relates to certain improvements in the construction of switch-boards such as are commonly employed at the central offices of telegraph and telephone-exchange systems for placing in electrical connection the terminals of any two normally-independent conductors or subscriber-lines, or for connecting them with an apparatus at the central office for receiving and transmitting signals or communications.

Among the various methods heretofore employed for connecting the terminals of the conductors constituting the subscriber-lines, the two which have proved to be the most efficient in practice are, first, that in which each subscriber-line is provided with a metallic terminal plate, which respective plates may be placed in electrical connection, in any desired combination, by means of movable connectors formed of switch-plugs electrically united with each other by flexible conducting-cords; and, second, that in which each subscriber-line terminal is provided with two conducting-strips or series of contact-plates, each intersecting the plane of one of the conducting-strips or series of contact-plates of each of the remaining terminals, at which intersecting points a movable connector is applied as required. The principal inconvenience experienced in the use of the contact-plates and conducting-cords arises from the liability of the cords to become entangled with each other when several subscribers are to be coupled with each other, and to be broken by the continual bending to which they are subject. This construction, moreover, necessitates the handling of two switch-plugs, one being inserted in the contact-plate of each subscriber-line. The second method, while it dispenses with the employment of the switch-cord and one of its switch-plugs, necessitates a proportionate increase in the size of the board for accommodating a given number of subscriber-line terminals, for the reason that the provis-

ion of an intersecting point for the terminals, whereby any one line may be placed in connection with any other by means of a single connector or switch-plug, involves the employment of two contact-strips for each subscriber-line terminal. These strips are placed at right angles with each other, and each terminal has therefore two distinct contact-points at which it may be connected with any other terminal.

The object of my invention is to organize a switch-board in such a manner as to dispense with the use of switch-cords, which will at the same time be simple in its construction and compact in its arrangement, and having one point, and one only, at which any given line terminal may be placed in connection with any other terminal by the use of a single movable connector—such as a switch pin or plug of ordinary construction.

My invention consists in constructing a switch-board with a metallic longitudinal terminal conductor or strip for each subscriber-line, the conductors or strips being arranged in consecutive order, corresponding to the designating-numerals of the subscriber-lines, and in providing each longitudinal terminal conductor with a series of contact-plates, one corresponding to and connected by transverse conductors with each numerically-succeeding longitudinal conductor, the contact-plates corresponding to the numerically-preceding longitudinal conductors being dispensed with. The reason for making use of this organization will be evident when it is considered that any given terminal may be connected with any succeeding terminal by means of a movable connector inserted between itself and the contact-plate corresponding to and transverse-ly connected with the said succeeding terminal, and that the given terminal may be connected with any preceding terminal by means of a connector inserted between the said preceding terminal and the contact-plate corresponding to the given terminal.

The invention also consists in arranging the contact-plates in a convenient manner upon either side of the longitudinal terminals or contact-strips, and in certain details of construction hereinafter specifically set forth.

In the accompanying drawing, which illus-

trates my invention, I have shown a front elevation of a switch-board embodying the several features of my invention, and showing in diagram its circuit-connections.

5 Referring to the drawing, A represents a suitable frame or board for supporting the various devices constituting the switch-board. The numerals 1 to 25, inclusive, represent a series of subscriber-lines, twenty-five in number, respectively connected with correspond-
10 ing bars or strips of metal, (numbered a' a^2 a^3 , &c.,) which constitute longitudinal terminal conductors for the respective subscriber-lines. The conducting terminals a' a^2 a^3 , &c., are preferably arranged vertically and in numerical
15 order upon the board A, beginning at the left side and increasing numerically toward the right to the number 13, while at the same time they successively decrease in length toward the right. The fourteenth strip is placed
20 beneath the thirteenth, and the numerically-succeeding strips are placed at the lower portion of the board, increasing numerically and decreasing in length toward the left, thus filling up the triangular space left vacant by the
25 strips of decreasing length upon the upper portion of the board. Thus the strip numbered a^{15} comes beneath the strip a^{12} , and a^{16} beneath the strip a^{11} , as illustrated with reference to the conductors 12 and 20 by the dotted
30 lines M. The first terminal conductor numbered 1 is provided upon either side with contact-plates b , one corresponding to and connected with each succeeding strip. The contact-plates b are numbered from 2 to 25, inclusive, the even numerals being preferably arranged upon the left of the strip a' and the odd numerals upon the right. Each contact-
35 plate b^2 b^3 b^4 , &c., is electrically connected by a transverse branch conductor beneath the board with that longitudinal conductor a which is designated by a corresponding numeral, as illustrated with reference to the conductors 12 and 20 by the dotted lines M. Suitable apertures, c , are formed along the whole length of
40 the longitudinal conductors upon each side, opposite the contact-plates b , for allowing the insertion of suitable wedge-shaped switch-pins, d , which constitute movable connectors and serve to place any conducting-strip in electrical
45 connection with any desired adjacent contact-plate, and thus with its corresponding longitudinal conductor. The contact-plates upon the right of the terminal a' serve also for making connections upon their opposite
50 sides with the second terminal, a^2 , and another series of contact-plates, b^4 b^6 b^8 , &c., corresponding with the numerically-succeeding terminals which are designated by the even numerals, is arranged upon the right of the terminal a^2 . In the like manner each terminal a' a^2 a^3 , &c., is provided upon one side with contact-plates corresponding to and transversely
55 connected with the terminals designated by the uneven numerals greater than its own, and upon the other side with contact-plates of the

same character designated by the even numerals.

At the outer end of each terminal or conducting-strip a' a^2 a^3 , &c., is provided a contact-plate, e . Each of these contact-plates is transversely connected by a wire, w , in which
70 is preferably included an annunciator device or visual signal, H, with a conductor, G, extending to the earth at E. The annunciator devices H, one of which is provided for each subscriber-line, may be of any suitable or well-known construction, adapted to be actuated by
75 a current from the subscriber-line traversing the corresponding earth-circuit to exhibit a designating visual signal corresponding to that line. The devices which I prefer to employ consist of an electro-magnet provided with means for releasing a drop, h , and exhibiting a numeral corresponding to that employed for designating the corresponding subscriber-line. This apparatus is well known, and forms no part of my invention. A movable connector or switch-pin, d , is normally
80 placed in one of the apertures c of each terminal strip a , opposite the adjacent contact-plate e , thereby placing each subscriber-line in electrical connection with the earth through its corresponding annunciator. A second series of contact-plates, f , is likewise provided, one
85 being placed at the outer extremity of each conducting-strip a . The plates f are placed in electrical connection, by a transverse wire, w' , with any suitable signal-transmitting device, K, thence by the wires w^2 and w^3 through suitable transmitting and receiving apparatus, as
90 shown at R and R', with the earth at E'. A battery, O, one pole of which is connected with the earth at E' and the other pole with the working-contact of the transmitting device K, may be used for transmitting electrical impulses as desired upon the conductor G', and thus through any terminal conducting-strip a , by way of the corresponding contact-plate, f ,
95 when the two are connected by a connector, d , and thus to the corresponding subscriber-line. I have shown also a local battery, o , which is employed in connection with the transmitting device R in a manner well understood.

The operation of the device is as follows: Each subscriber-line 1 2 3, &c., is normally
100 kept in electrical connection, through the corresponding longitudinal terminal a , with one of the contact-plates e by means of the connectors or switch-pins d , which electrically unite the same, and thus, by means of the conductors w and G, directly with the earth at E. Any individual subscriber desiring to be placed in communication with another signals to the central office by closing the electric circuit
105 through his subscriber-line. Thus if subscriber No. 6, for example, desires to be connected with subscriber No. 12, he closes his circuit through the subscriber-line 6, the current thereupon traversing the terminal a^6 , connector d , contact-plate e^6 , wire w , the annunciator device H⁶ to the conductor G, and thus reaching the earth at E.
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The annunciator-drop, being released by the action of this current, exhibits the numeral 6. The attendant at the central station thereupon transfers the movable connector d^6 , adjacent to the conducting-strip a^6 , to the aperture e , adjacent to the contact-plate f , thereby connecting the subscriber-line 6 with the earth at E' by a route which includes the transmitting and receiving devices R and R' . By corresponding with the subscriber No. 6 through the telephone or other apparatus the operator ascertains that he desires to communicate with subscriber No. 12. He thereupon removes the switch-pin d^{12} , which normally connects the terminal conducting-strip a^{12} with the adjacent contact-plate e , and inserts it between the terminal a^{12} , and the corresponding contact-plate, f^{12} , thereby connecting the transmitting device K with the subscriber-line 12. By operating the transmitting device K the subscriber No. 12 is then signalled. After calling subscriber No. 12 the switch-pin or connector d^6 is transferred from the contact-plate f to the aperture e of the plate a^6 opposite the contact-plate b^{12} , thereby placing the two subscribers' lines in electrical connection through the transverse conductor M beneath the board. Upon ascertaining that the two subscribers are in communication, the first-named connector d^{12} may be removed and the two subscribers left in direct electrical connection.

The manner of connecting any calling subscriber with another whose designating number is numerically greater than that of the calling subscriber corresponds precisely to that already described. The only difference in the method of connecting a calling subscriber with another subscriber whose designating number is less than his own consists in uniting the two by employing the connecting-strip of the subscriber designated by the smaller numeral, which is effected by connecting the

same with the adjacent contact-plate of the subscriber designated by the greater numeral. In other words, every connection between two subscribers is made by connecting the terminal designated by the smaller numeral with the contact-plate connected with the terminal strip designated by the greater numeral.

It will be understood from the foregoing description that for each possible combination of any two subscribers one point of connection only is provided, an organization which materially reduces the size of the board and simplifies the construction of the same by cancelling one-half the usual number of apertures for receiving the switch-plugs or connectors.

I have shown and described a switch-board as adapted to twenty-five subscribers. This particular number, however, is not material, and may be increased or diminished to any required extent, as found desirable. The electrical connections, moreover, of the annunciator device and the signal-transmitting devices may be varied at will.

I claim as my invention—

The combination, substantially as hereinbefore set forth, with a series of independent line-wires, of a switch-board consisting of the series of longitudinal conductors a , of regularly decreasing lengths, the shorter conductors being arranged end to end with the longer conductors of the series, in such order as to render the combined lengths of each pair approximately equal, the contact-plates b , and the transverse branches M , electrically united therewith, substantially as described.

In testimony whereof I have hereunto subscribed my name this 18th day of September, A. D. 1882.

THOMAS J. PERRIN.

Witnesses:

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MILLER C. EARL.