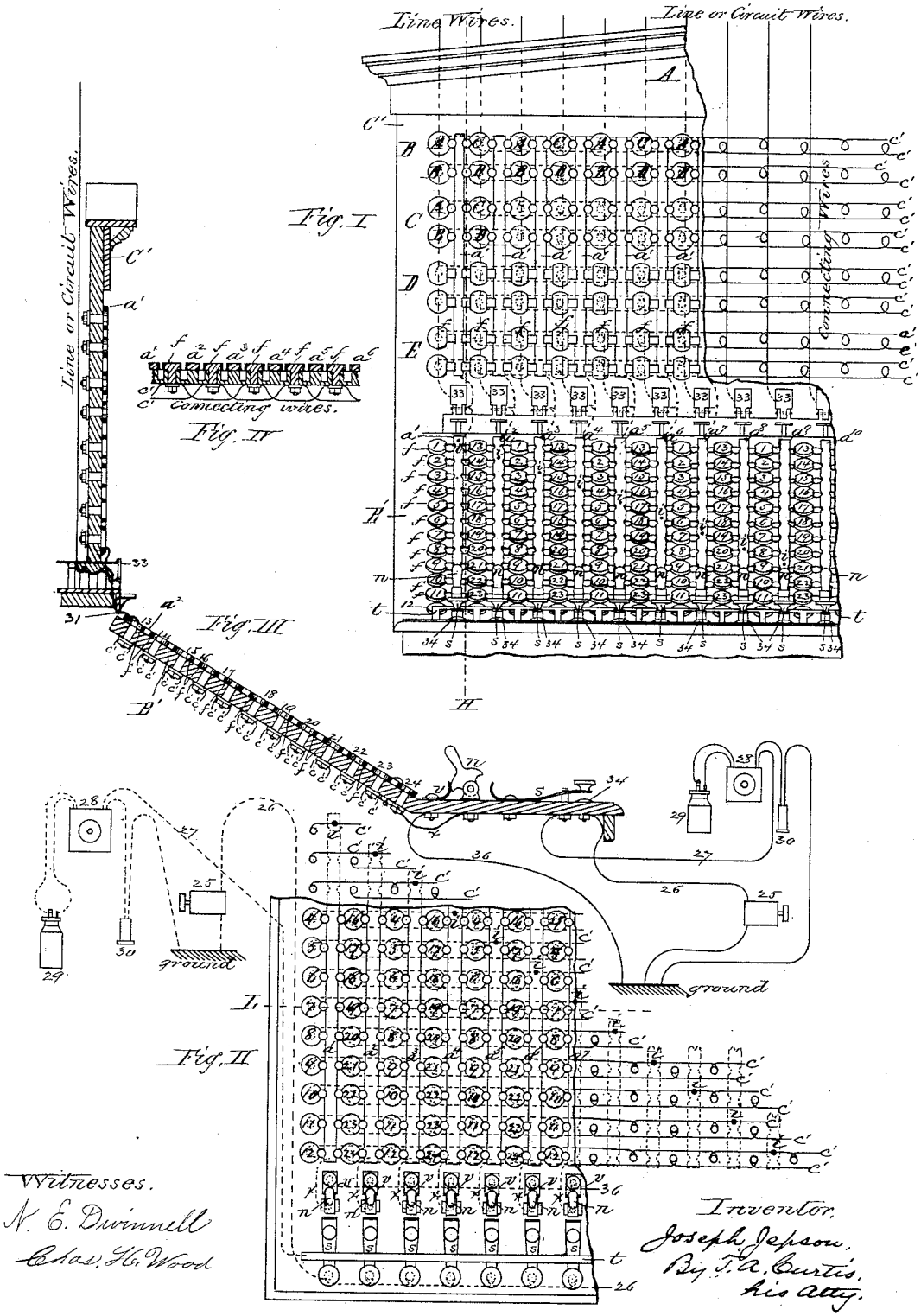
(No Model.)

J. JEPSON.

SWITCH BOARD FOR TELEPHONE SYSTEMS.

No. 265,092. Patented Sept. 26, 1882.



UNITED STATES PATENT OFFICE.

JOSEPH JEPSON, OF WESTFIELD, MASSACHUSETTS.

SWITCH-BOARD FOR TELEPHONE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 265,092, dated September 26, 1882.

Application filed February 3, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH JEPSON, of Westfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Improvement in Switch-Boards for Telephone Systems, of which the following is a description and specification.

The object of my invention is to enable the operator at the exchange or central office of a telephone system to connect any two circuits of the system by a single plug connection or medium, and to similarly connect any two sections of the switch-board, and also to include an office transmitter and telephone in the circuit when any two line-circuits are connected; and I accomplish this by the means substantially as hereinafter described, and illustrated in the accompanying drawings, in which—

Figure I is a front view of a portion of a switch-board made according to my invention, and also showing the method of connecting the connecting-wires with the connecting-plates. Fig. II is a plan view of a portion of the switch-board, and showing the method of making the permanent connection between the circuit-strips and the connecting-wires. Fig. III is a vertical transverse section at line H of Fig. I of a switch-board made according to my invention, and showing a generator, telephone, and transmitter connected therewith; and Fig. IV is a horizontal longitudinal section of a portion of the board at line L of Fig. II.

In the drawings, B′ represents the horizontal or inclined portion of the switch-board, to which are secured the circuit-strips, as a' a^2 a^3 a^4, which are arranged across the board parallel with each other and to any desired number, and between each two adjacent strips, and equidistant from each, is arranged a series of plates, as *f*, which are placed in a line and parallel with said circuit-strips. These plates may be secured to the board by being made in the form of bolts extending through the board, with nuts turned on the lower threaded ends, or in any other convenient way, so as to remain permanently in place; and the edges of each plate, as *f*, adjacent to the strip, as a', may have a recess made therein, with a corresponding recess made in the edge of the strip opposite each plate *f*, so that a plug of cylindrical or other convenient form may be inserted between any one plate, as *f*, and the strip on either side of it, to make electrical connection between said plate and circuit-strip. One row or series of these plates, as *f*, on the board may be numbered as desired—say from one to twelve in regular order—and the adjacent row or series be numbered—say from thirteen to twenty-four, inclusive, in regular order—with a circuit-strip, as a', between these two series of plates; and this arrangement of a series of plates, as *f*, and a circuit-strip, as a', alternately placed with reference to each other, is followed along the board to any desired extent, each two series of plates being numbered or designated in any convenient way, as above described.

A series of connecting-wires, as c', is secured to the plates, as *f*, or to the lower ends of the studs or bolts upon which the plates are made or secured, these wires being equal in number to the number of plates *f* and strips, as a', used. For example, if twenty-four plates are used, and of course twenty-four circuits in the system, then twenty-four connecting-wires, as c', will be required, and these wires, as c', are connected with the plates, as *f*, or with the studs or bolts to which the plates are attached, in the following manner: The first wire c' is permanently secured to every bolt, or its plate *f*, in all the series, which is marked 1, and this, as will readily be seen by reference to Fig. I, is every alternate plate at the upper end of the series of the horizontal portion B′ of the board, and the second or next wire c' is secured to every plate marked 13 in all the series of plates *f*, which, as will be seen by reference to Fig. I, are the other alternate plates at the upper end of the series of the same portion of the board. The third connecting-wire c' is secured to every plate (or to its bolt) marked 2 in all the series of plates *f*, and the fourth connecting-wire c' is secured to each plate marked 14 in all the series, and so on until all the wires c' and plates, as *f*, are connected in the manner above described, the connection between the plates, as *f*, and the said connecting-wires being a metallic or electric connection. These connecting-wires, as c',

merely extend the length of the switch-board, and all the plates, as *f*, on the switch-board which bear the same designating mark or number are electrically connected with a certain particular wire *c'*, each plate having the same designating mark or number, being connected with the same wire. In addition to this, each circuit-strip, as *a'*, a^2, &c., is also permanently electrically connected with some one of said connecting-wires, although no two circuit-strips are permanently connected to the same wire. For example, the first circuit-strip, as *a'*, is permanently connected with the first wire *c'* in the series of said wires at *i*, the second strip, as a^2, is permanently connected with the third wire *c'* in the series, the third strip, as a^3, is permanently connected with the fifth wire *c'* in the series, and so on until the successive circuit-strips have been connected with the alternate wires *c'* in the whole series; and the next circuit-strip is then connected permanently with the second wire *c'* in the series, the next strip is connected with the fourth wire in the series, and so on until all the circuit-strips and all the connecting-wires *c'* in the series are permanently electrically connected—one strip to one wire—as at the points marked *i*.

The vertical portion, as C', of the switch-board is provided with a similar arrangement of strips, as *a'*, and plates, as *f*, but the plates are preferably arranged in horizontal series of, say, two rows in each series, as shown at B C D E, and the connecting-wires *c'* are connected with the plates *f* in the same manner and according to the same arrangement as in the horizontal portion of the board; but instead of being limited in length to the length of this section of the board they extend to and along the length of that vertical section of the board indicated by the letter at the left on the vertical portion C'. (Shown in Fig. I.) Suppose, for example, that there are five sections of the switch-board in use in the office, each indicated by the letters A B C D E. The wires, as *c'*, in the group marked B extend along the length of the vertical section A, and thence to and along the length of the vertical section B. The wires *c'* in the group marked C extend along the section A, thence past section B and along the length of section C, and so on; but they are not electrically connected with the strips, as *a'*, on the upright portion of the board, as the other wires *c'* are on the horizontal portion.

The circuit-strips, as *a'* a^2, on the horizontal portion of the board are connected electrically with the vertical strips, as *a'*, on the vertical portion of the board, and also each with its line or circuit wire and its annunciator, as follows: The strip, as *a'*, on the horizontal portion of the board is connected with the strip, as *a'*, directly above it on the vertical portion of the board, and also with the first annunciator, and the first line or circuit wire comes in through or is connected directly with this annunciator, and each circuit-strip on the horizontal portion of the board is connected with the strip directly above it on the vertical portion of the board, and with the annunciator between, as by a wire, as 31; but the strips, as *a'*, on the vertical portion of the board are not connected with the line or circuit wires, except through the annunciator, as shown in Fig. III. The arrangement of strips, plates, and connecting-wires on the upright portion C of the switch-board is used for the purpose of connecting the different sections of switch-board in the same office.

A jack, as *n*, is secured to the board—one jack for each circuit-strip—with a ground-plate or "flipper," as *v*, secured to the board on one side of the jack, and a spring call-key, as *s*, secured on the other side, with a telephone-strip, as *t*, secured to and extending along the board above the call-keys, so that said keys are held up into contact with the telephone strip. Each jack is electrically connected with its respective circuit-strip, as by a wire, *x*, and all the ground-plates or flippers, as *v*, are electrically connected together and with the ground, as by a wire, 36.

A generator, as 25, may be located in any convenient place, and is connected with the contact-point, as 34, beneath each call-key, as by a wire, 26, and is also connected with the ground, as shown in Figs. II and III, and the telephone-strip, as *t*, is also connected with a transmitter and telephone located in any convenient place near the switch-board in the office, with the ground-connection from said telephone, all as clearly shown in Fig. III.

When this board is in practical use the circuit-strips are numbered on each horizontal board, as 1 2 3, &c., in regular order, commencing at either end of the board—say at the left hand—and the number of plates, as *f*, used corresponds with that of the number of circuit-strips used, and these plates are also numbered in regular order to correspond with the circuit-strips, inasmuch as the object of the number on each plate is to designate a particular circuit-strip on the board which is connected with the corresponding circuit of the system; but the plates are located one half on one side of a circuit-strip and the other half on the other side, as hereinbefore described, and illustrated in the drawings.

Suppose, in using a board constructed as above described, with the jacks in connection with the ground-plates, as *v*, as shown in Figs. II and III, that the annunciator should indicate a call from circuit 1 in the system. The operator at the central office moves the jack, as *n*, at the circuit-strip *a'* on the horizontal portion of the board over and in connection with the corresponding call-key, as *s*, opposite said circuit-strip, which makes electric connection with the telephone-strip and telephone, as 30, through which the operator receives the call. Suppose the station calling from circuit 1 desires to be connected with a station on circuit 4. This jack opposite the circuit-strip 1 is

then moved away from the call-key *s* into a vertical position, and the jack, as *n*, opposite the circuit-strip a^4, is moved over against the call-key, as *s*, and the operator calls up the station on circuit 4 with which the party on circuit 1 desires to communicate, and a metal plug is inserted either between the circuit-strip *a'* and the plate *f* (marked 4) or between the circuit-strip a^4 and the plate marked 1. It makes no difference in which of these places the plug is inserted, as the electric connection is made between the two circuits 1 and 4 by only one plug-insertion or a single connection. Suppose the station on circuit 1 desires to be connected with a station on circuit 60, which comes in on section D of the switch-board. The operator at section A of the board, where circuit 1 comes in, merely inserts the metal plug between circuit-strip *a'*, connected with the annunciator at circuit 1, and the plate marked D on the vertical portion of the board, and the operator at section D inserts the plug between the strip corresponding to and connected with circuit 60 and the plate marked A on the vertical portion of his section of the board, and the connection between the two circuits is made.

As the number marked on the surface of each plate, as *f*, in the series is for the purpose of designating the circuits and their respective circuit-strips, I denominate these plates the "designating-plates." It will be seen by the above description that all the designating-plates, as *f*, on the horizontal portion of the board which bear the same designating number or mark are permanently electrically connected by one of the connecting-wires *c'* in the series with the circuit and circuit-strip designated by the mark or number on said plates, so that all that is required to make electric connection between any two circuits and circuit-strips on the same section of the board is for the operator to insert a single plug in either one of two places.

It is evident that any other convenient form of jack may be used than that herein shown, and it is also evident that instead of using a plug to make the desired connection between any designating-plate and a circuit-strip a jack may be used instead. For example, each designating-plate, as *f*, may have pivoted thereto an ordinary jack, as *n*, (shown in the drawings,) and adapted to be moved over to either side into contact with either circuit-strip; but when standing upright it would not be in electric connection with anything except its own series of designating-plates and their connecting-wire beneath; or the jack might be pivoted to the upper surface of the circuit-strips between two adjacent designating-plates, as *f*, and the desired connection made by moving the jack over to either side, and thus making connection between the desired circuit-strip and designating-plate.

The circuit-strips may be secured to the surface of the board, if a connecting-plug is to be used for making connections, with small holes in the board at the proper places to allow the plug to enter between the strips and plates; or they may be secured in any other desired manner by being raised from the board and the plates also; but I prefer that both strips and plates should all be secured so that their upper surfaces may be upon the same plane, for the sake of appearance.

Having thus described my invention, what I claim as new is—

The combination, in an improved switch-board, of a series of circuit-strips, each connected with one of the circuits of the system, a series of connecting-wires, each connected with one of the circuit-strips, and a series of plates or disks arranged at right angles to the length of said strips, said disks and strips alternating with each other, and each alternate disk in a direction at right angles to the length of the strips being connected to the same connecting-wire, whereby any two circuits in the system may be electrically connected by a single plug at either one of two places, substantially as described.

JOSEPH JEPSON.

Witnesses:
T. A. CURTIS,
CHAS. H. WOOD.